

Dynamic Multi-Modality Fused Imaging, Analysis, Computer Aided Diagnosis System

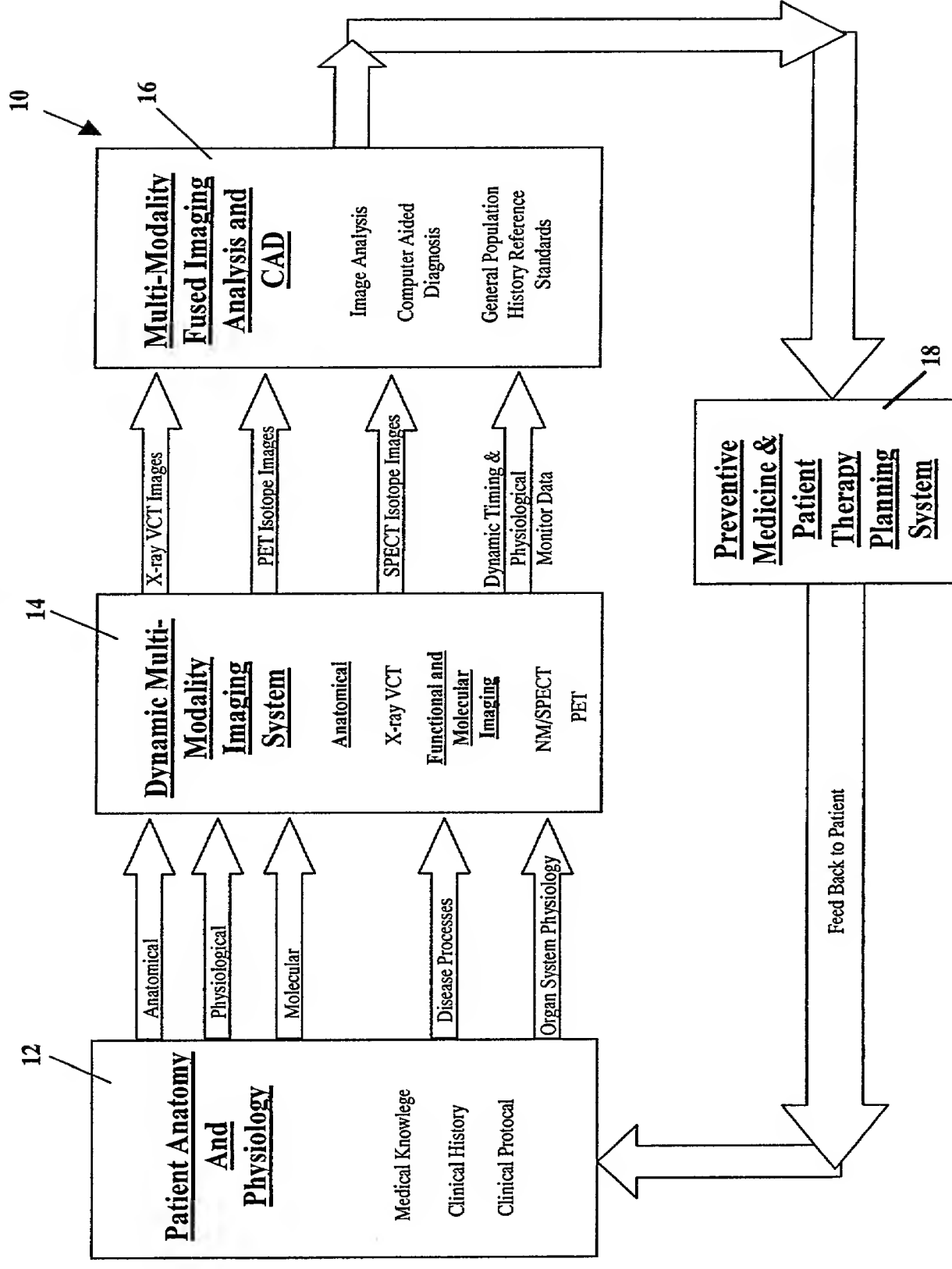


Figure 1

Multi-Modality Imaging System with Common Focused 2D Curved Detector

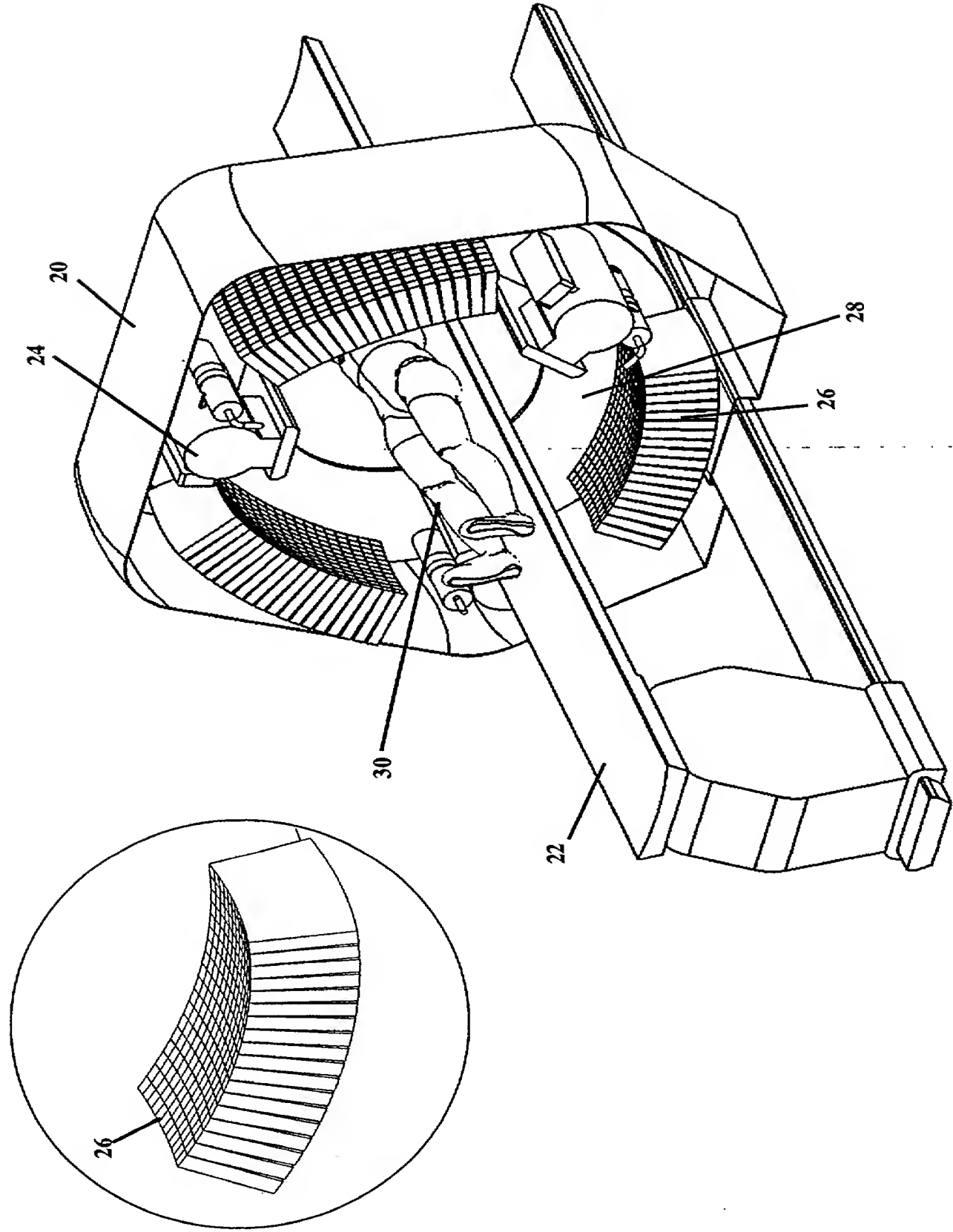


Figure 2

X-ray & Focused 2D Curved Detector Arrangement

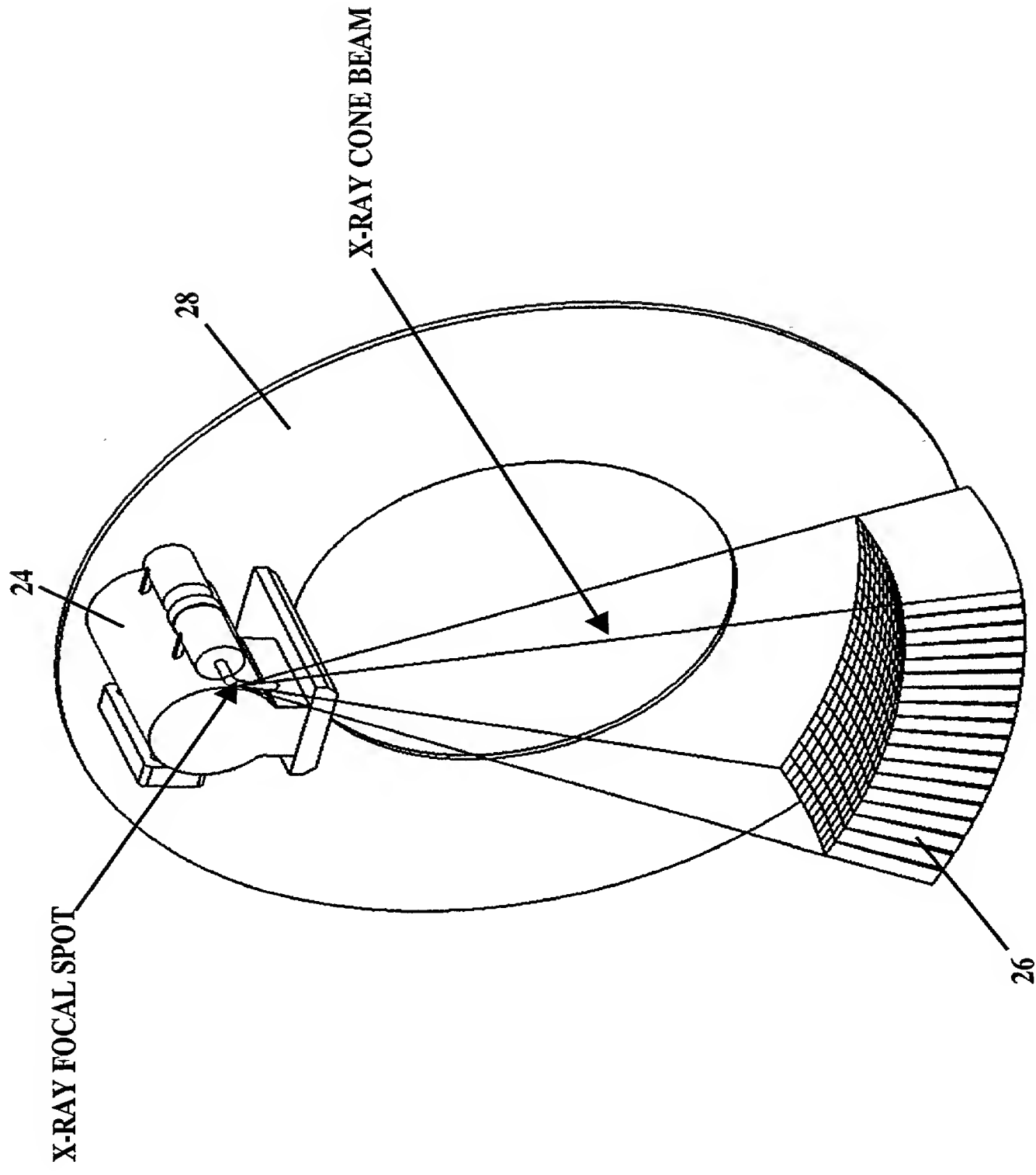


Figure 4

Cone Beam Source Collimation & Cone Beam Shaped Filter

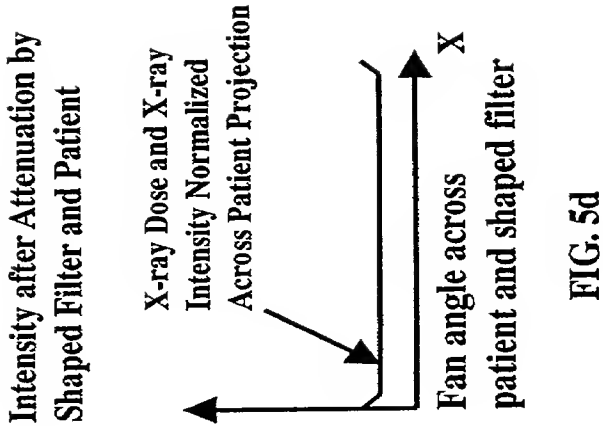
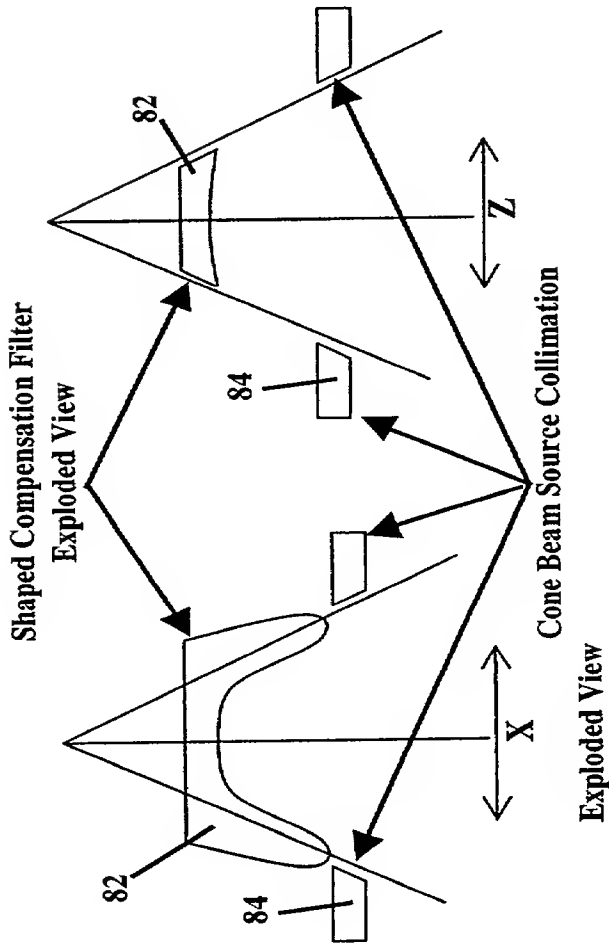
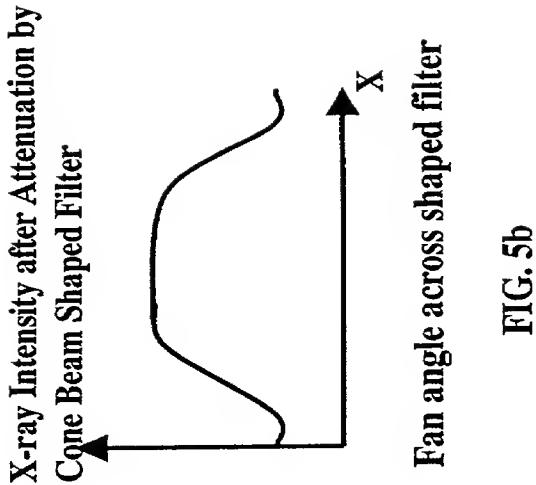
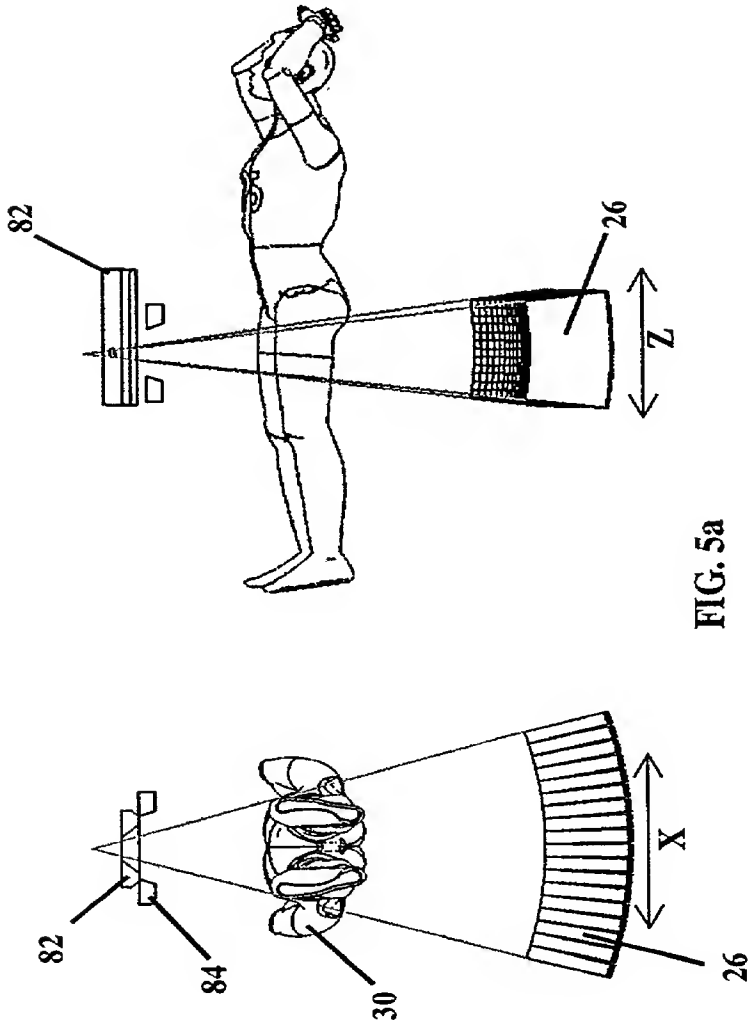


Figure 5

X-ray Cone Beam Focal Spot - Curved Detector Optics

Curved Detector to reduce spatial resolution loss and Best Conversion efficiency of X-ray

Focal spot from V-groove Type Anode has similar spot size appearance

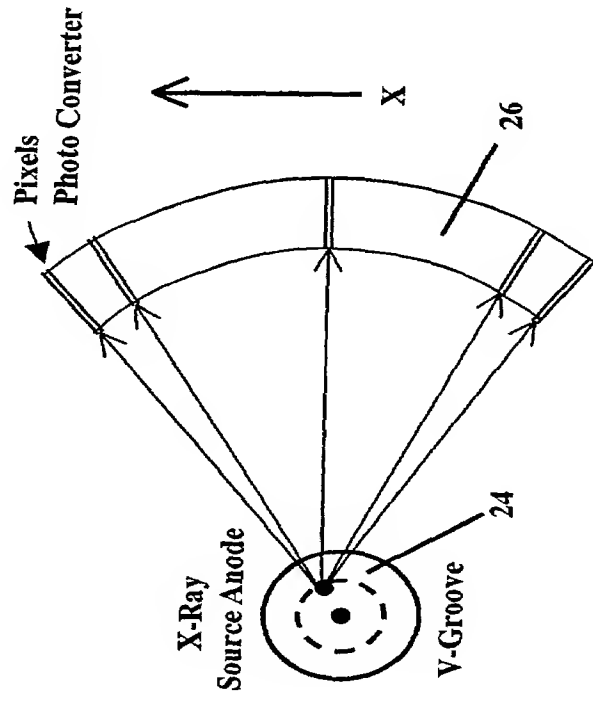
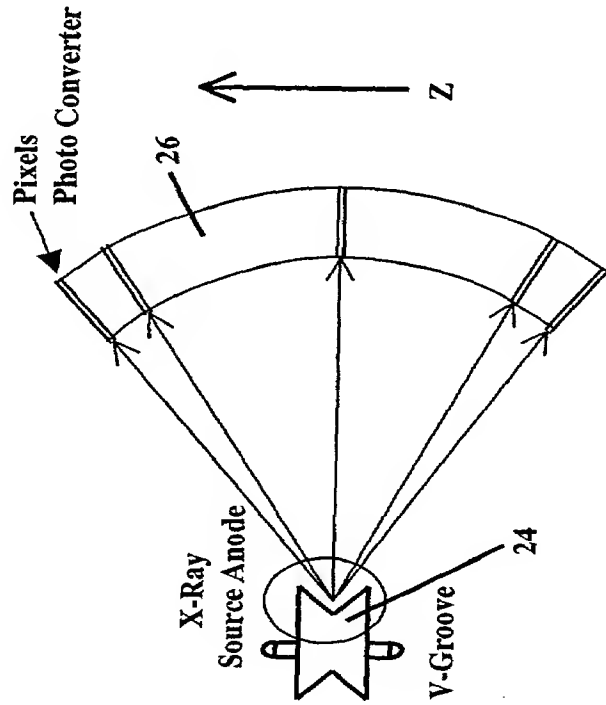


FIG. 6a

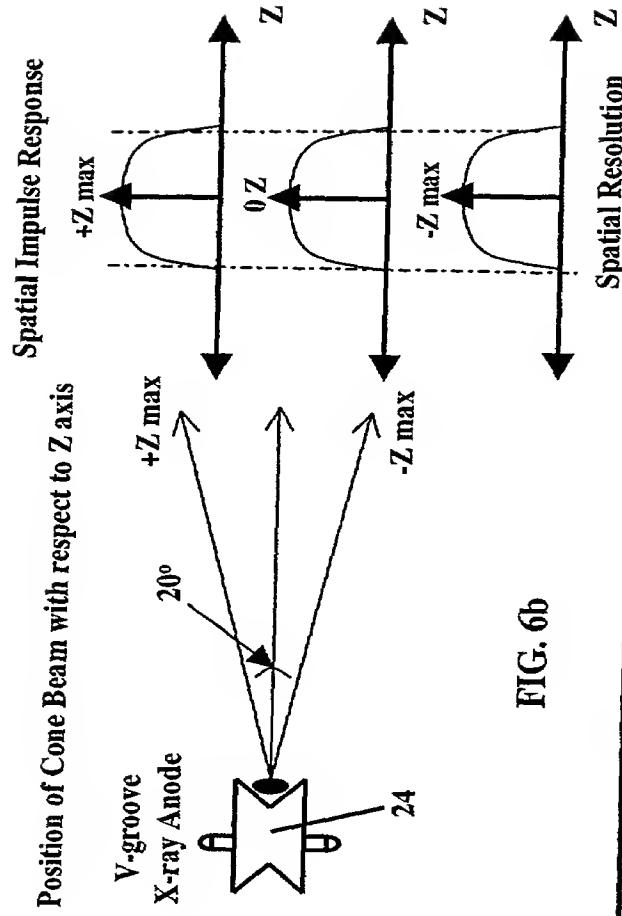


FIG. 6b

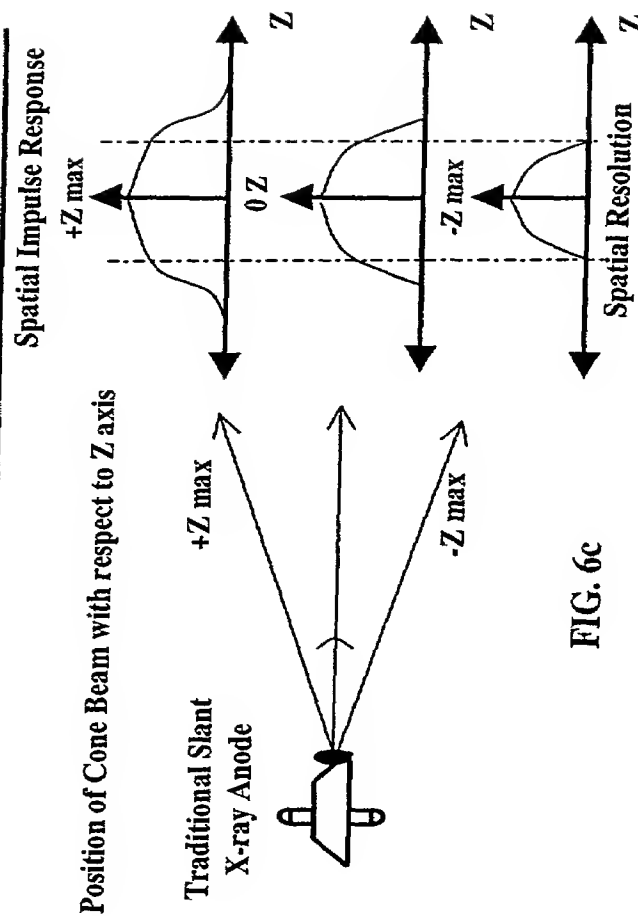


FIG. 6c

Figure 6

2 Dimensional Focal Spot Dithering for Improved Cone Beam

Spatial Resolution

X-ray Focal Spot Geometric Dithering For Doubling the Spatial Sampling Rate

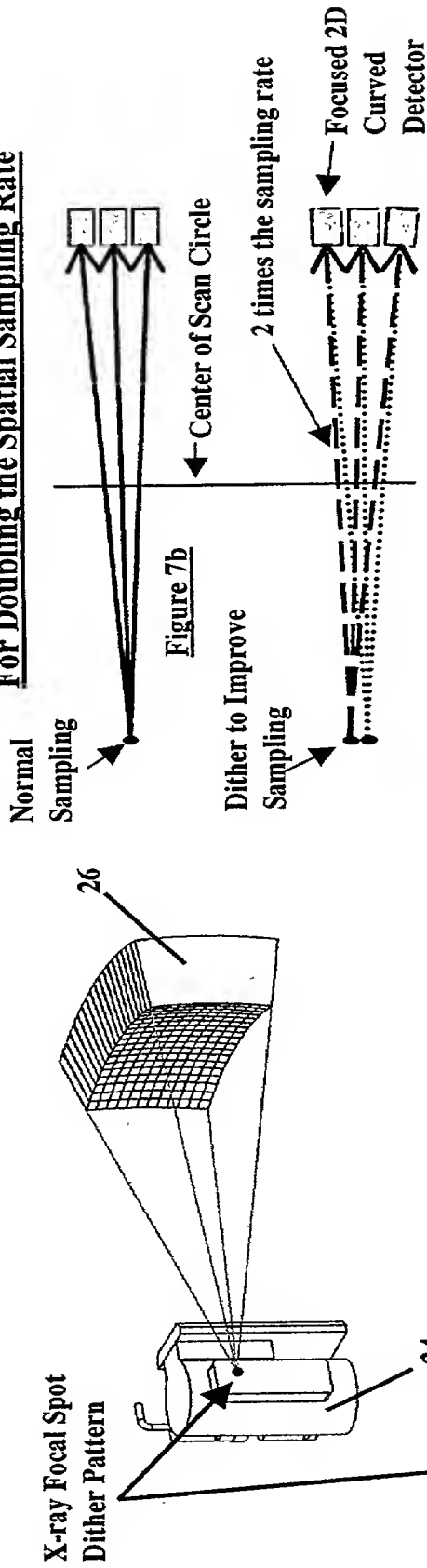


Figure 7a

2D X-ray Focal Spot Dither Pattern for 3D Cone Beam VCT

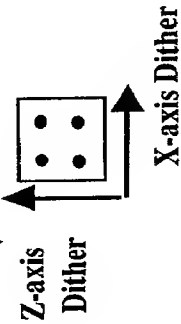


Figure 7d

Figure 7c

Spatial Resolution comparison between Single Sampling and 2X Dither Sampling

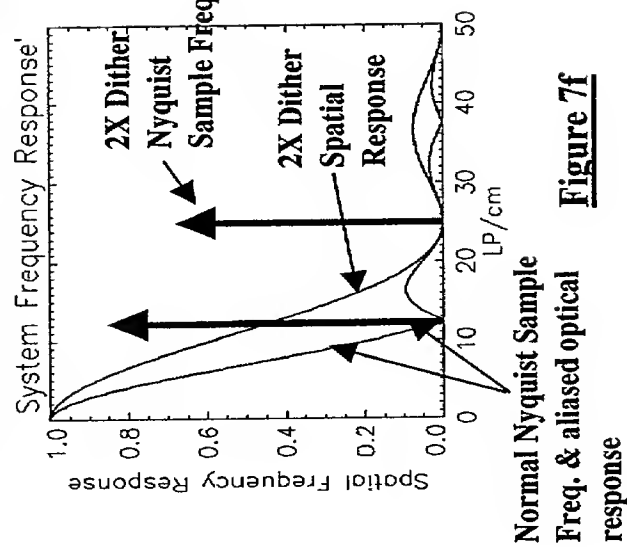


Figure 7f

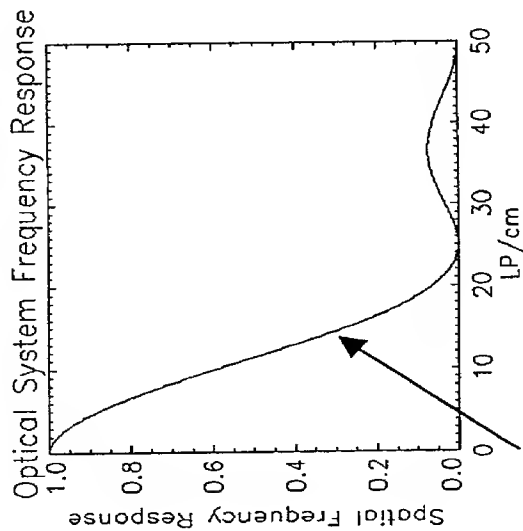


Figure 7e

Figure 7

Focused 2D Curved Detector Module

Focused Curved Detector Module
View Showing Focused 2D Anti-scatter Collimation with 2D Focused Pixels

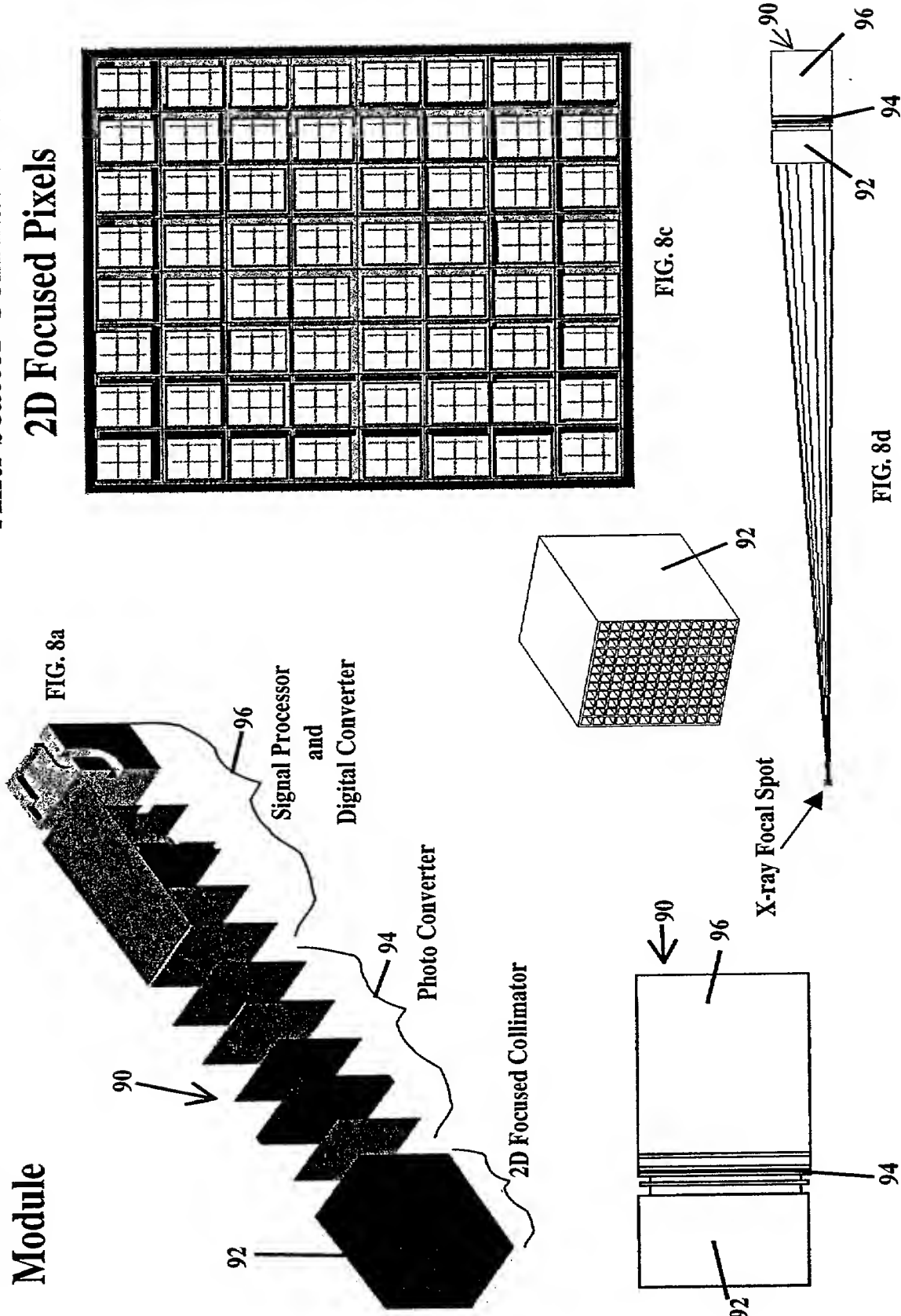


FIG. 8b

Figure 8

Focused 2D Area Detector with Adaptive Shaped X-Ray Optical Response

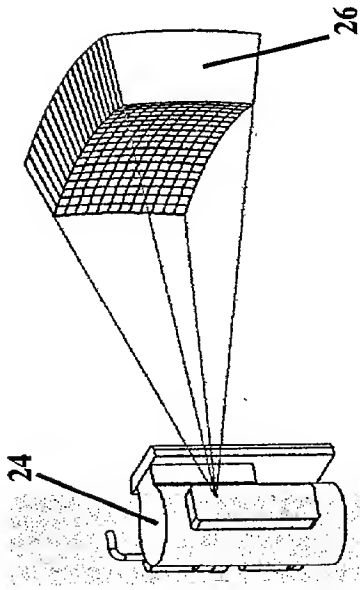
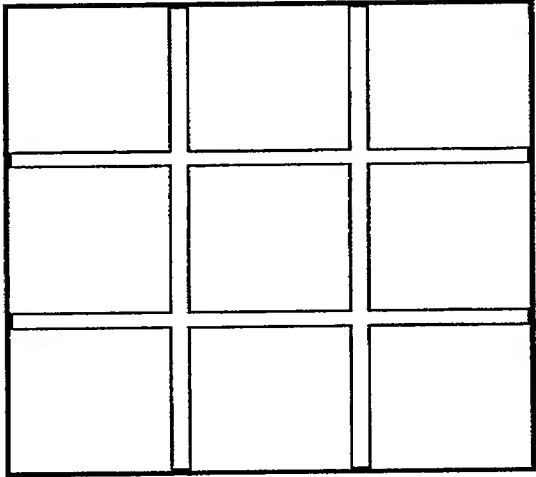
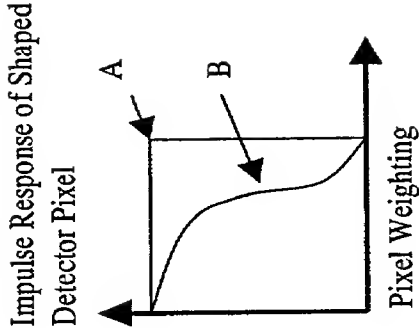


FIG. 9a

Impulse Response Shaping from Rectangular to Variable gaussian Roll-off Function. Shaping may be Fixed or Controlled



Detector Pixel
FIG. 9b



| | | |
|---|---|---|
| 1 | 1 | 1 |
| 1 | 1 | 1 |
| 1 | 1 | 1 |

| | | |
|-----|-----|-----|
| .2 | .44 | .2 |
| .44 | 1 | .44 |
| .2 | .44 | .2 |

A B

FIG. 9f

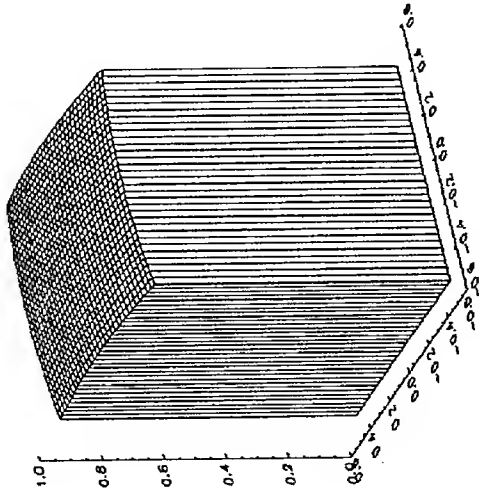


FIG. 9c

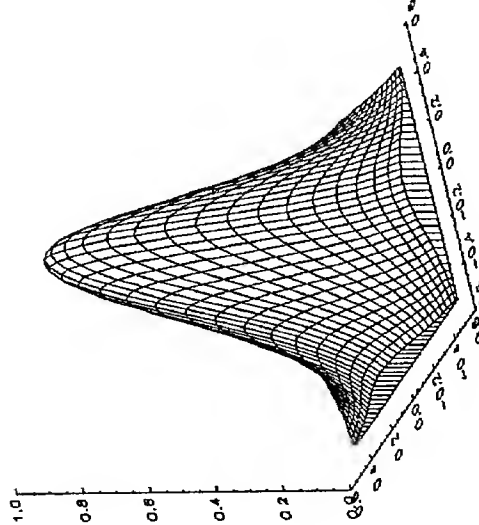


FIG. 9d

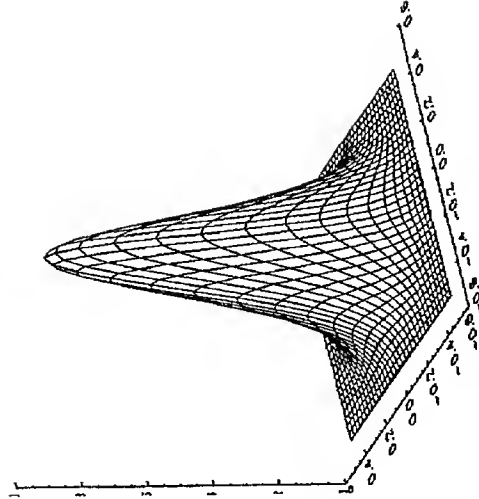
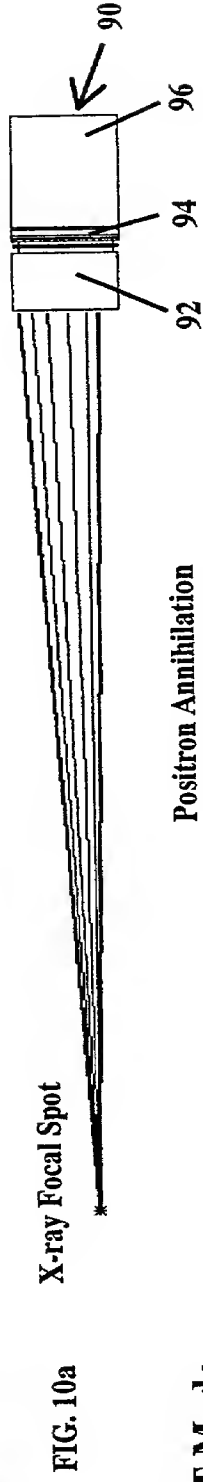


FIG. 9e

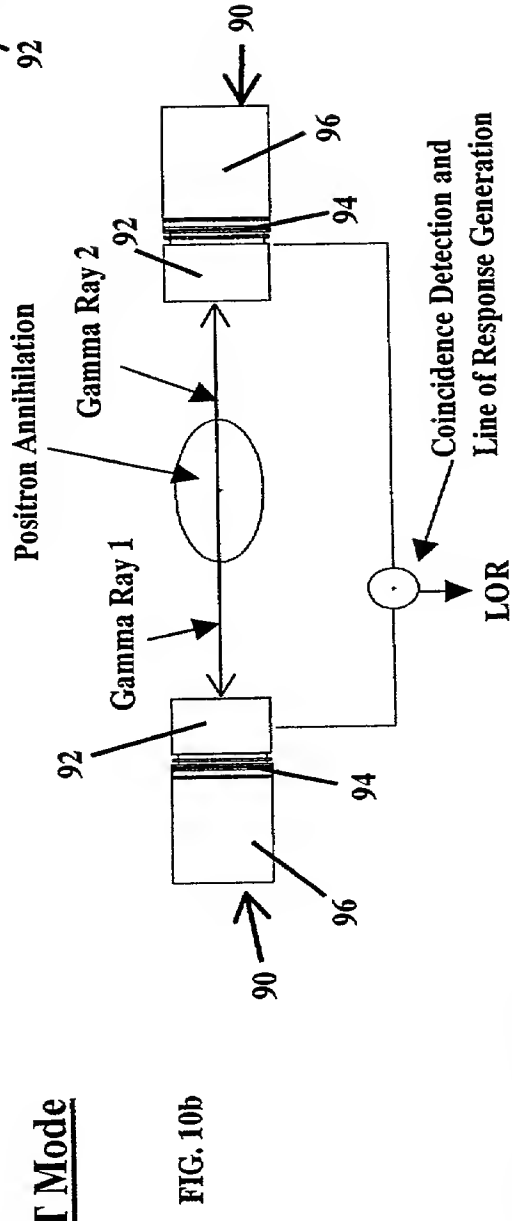
Figure 9

Multi-Modality XGA Detector Module

X-Ray Mode



PET Mode



NM/SPECT Mode

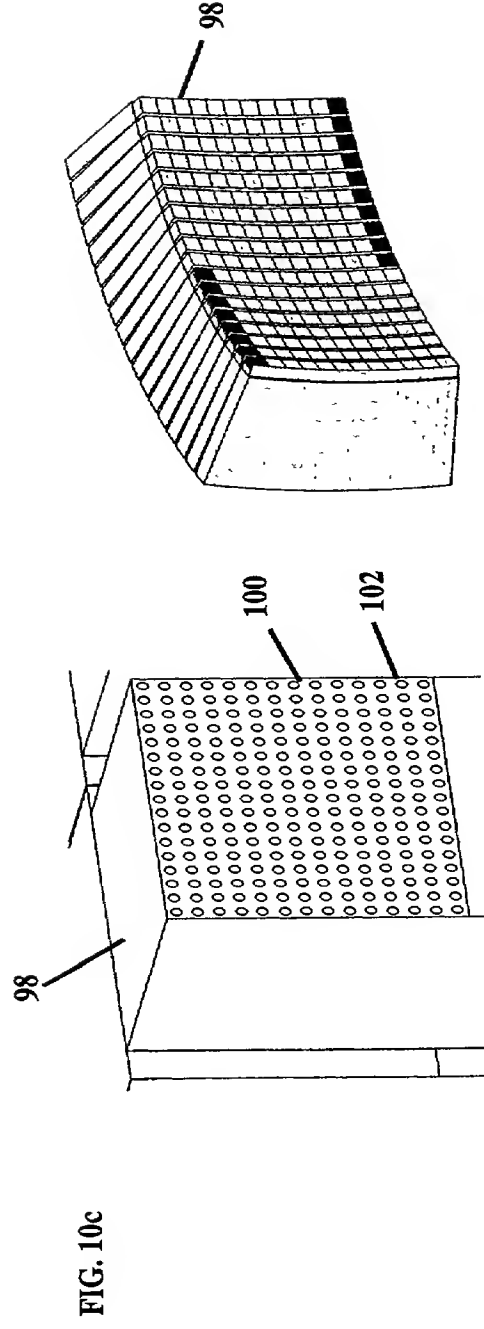


Figure 10

Detector Module Multi-Modality Collimation

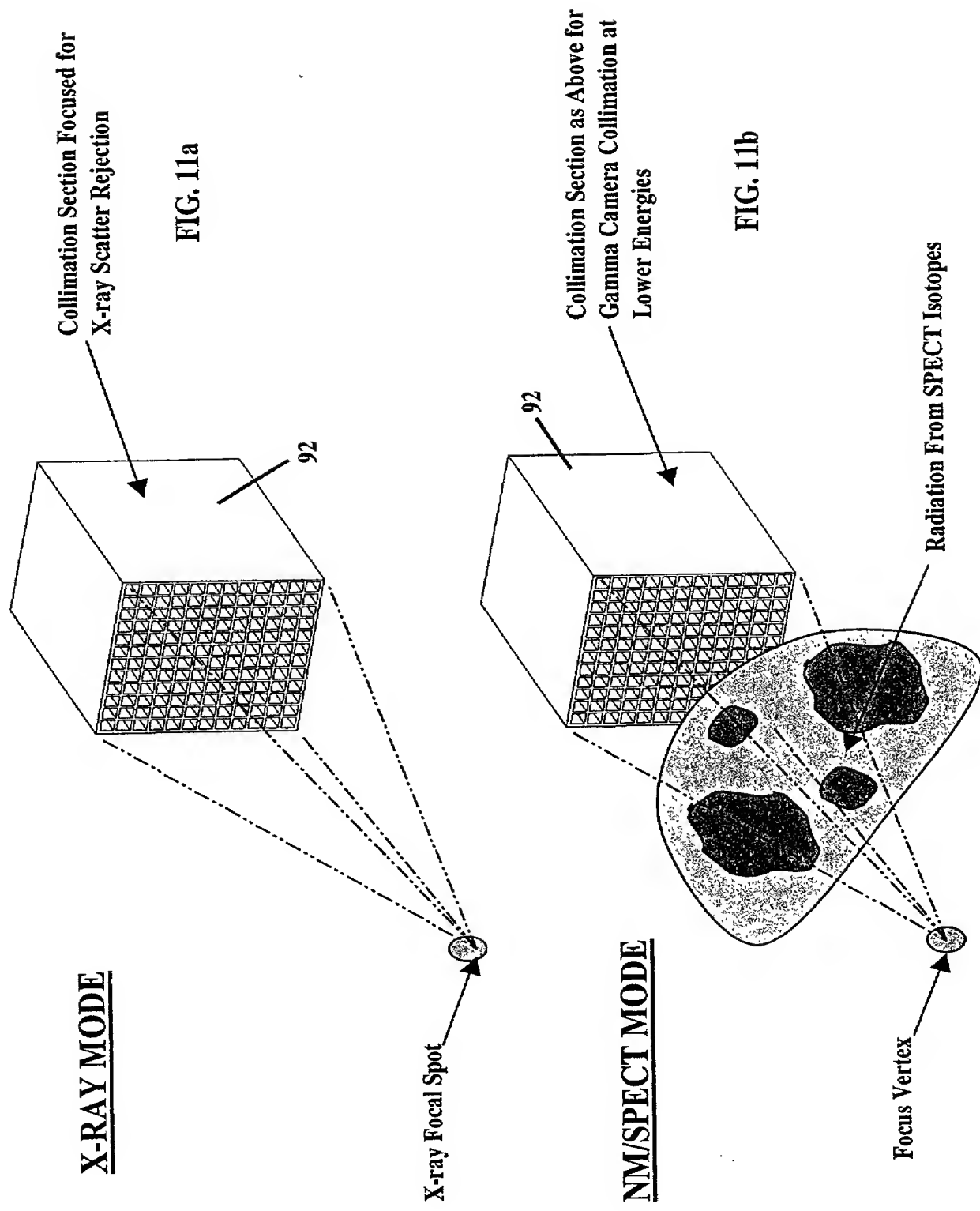


Figure 11

XGA Detector Module Signal Processing

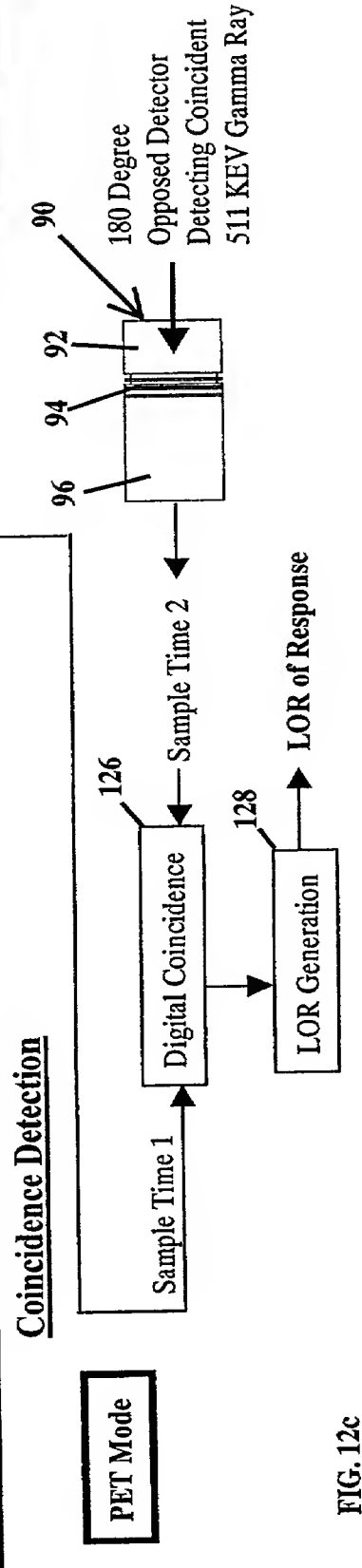
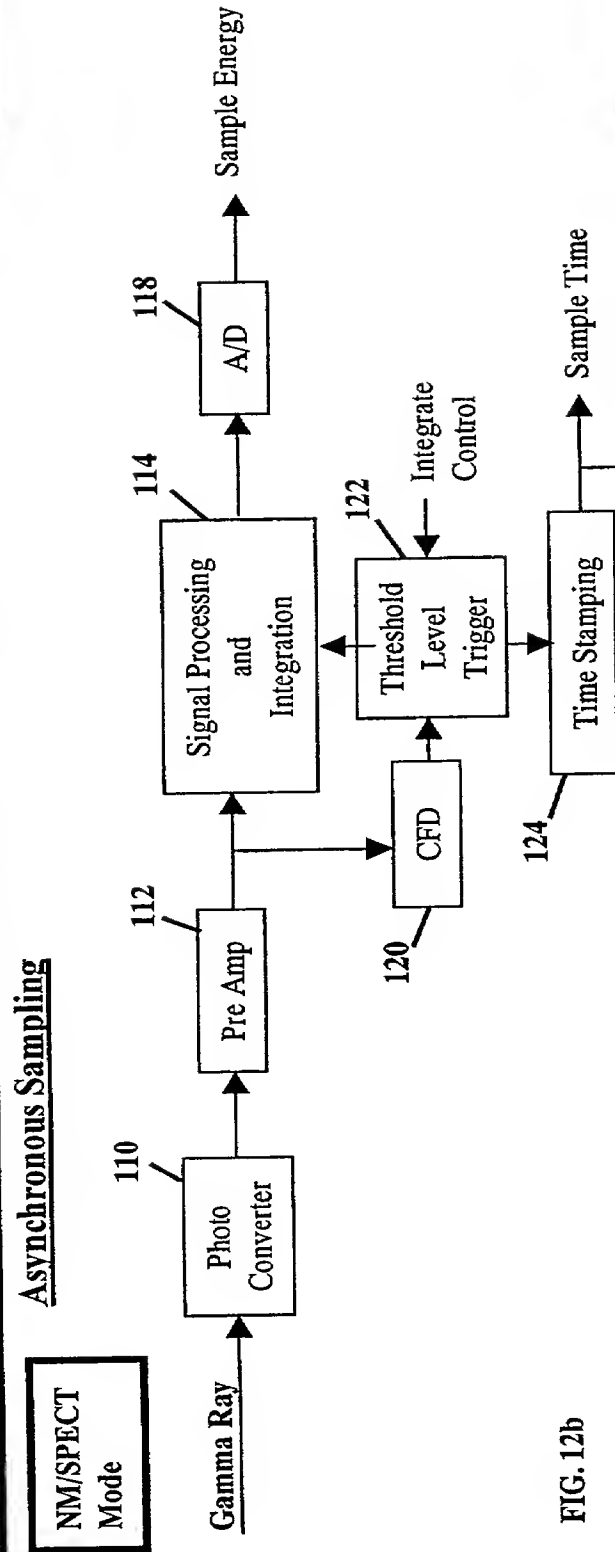
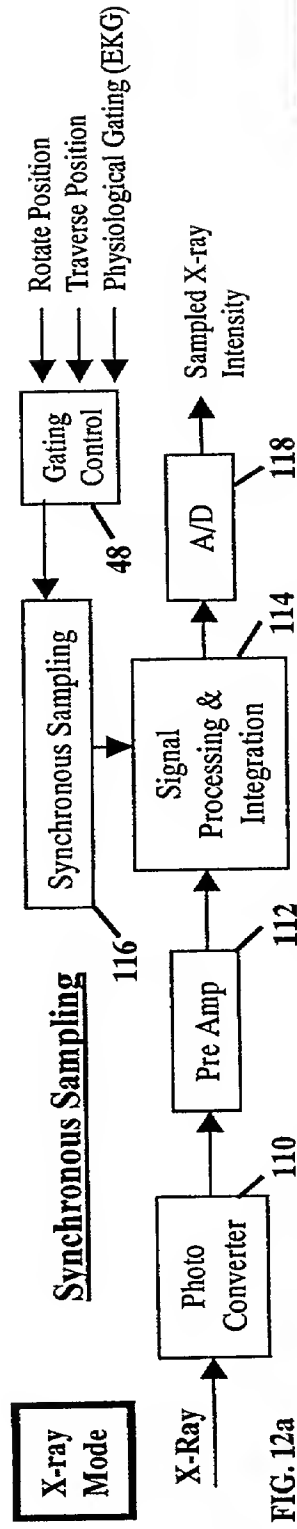


Figure 12

System with Optional PET Anti-Scatter Baffle

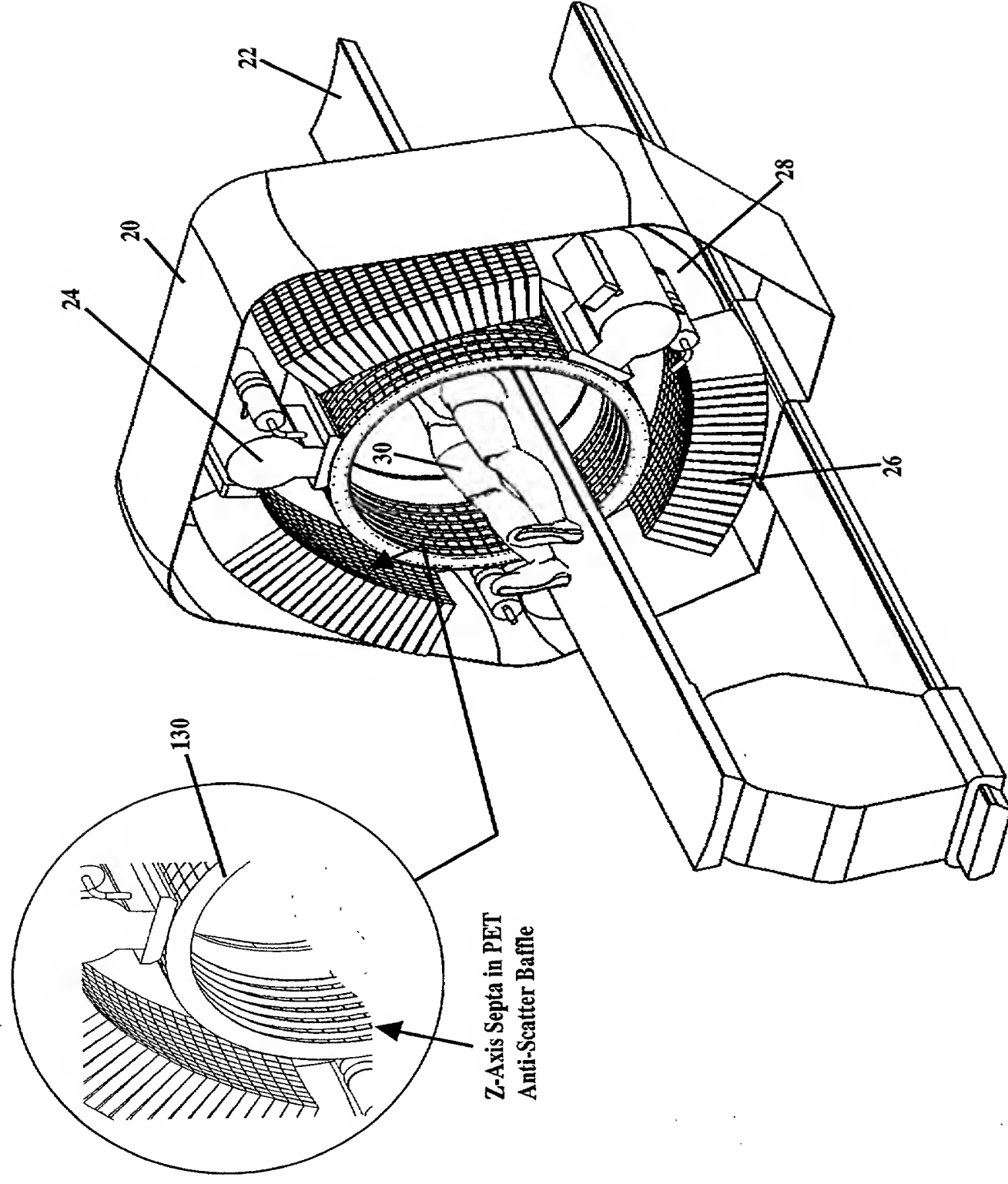


Figure 13

PET – Anti-Scatter Baffle SEPTA

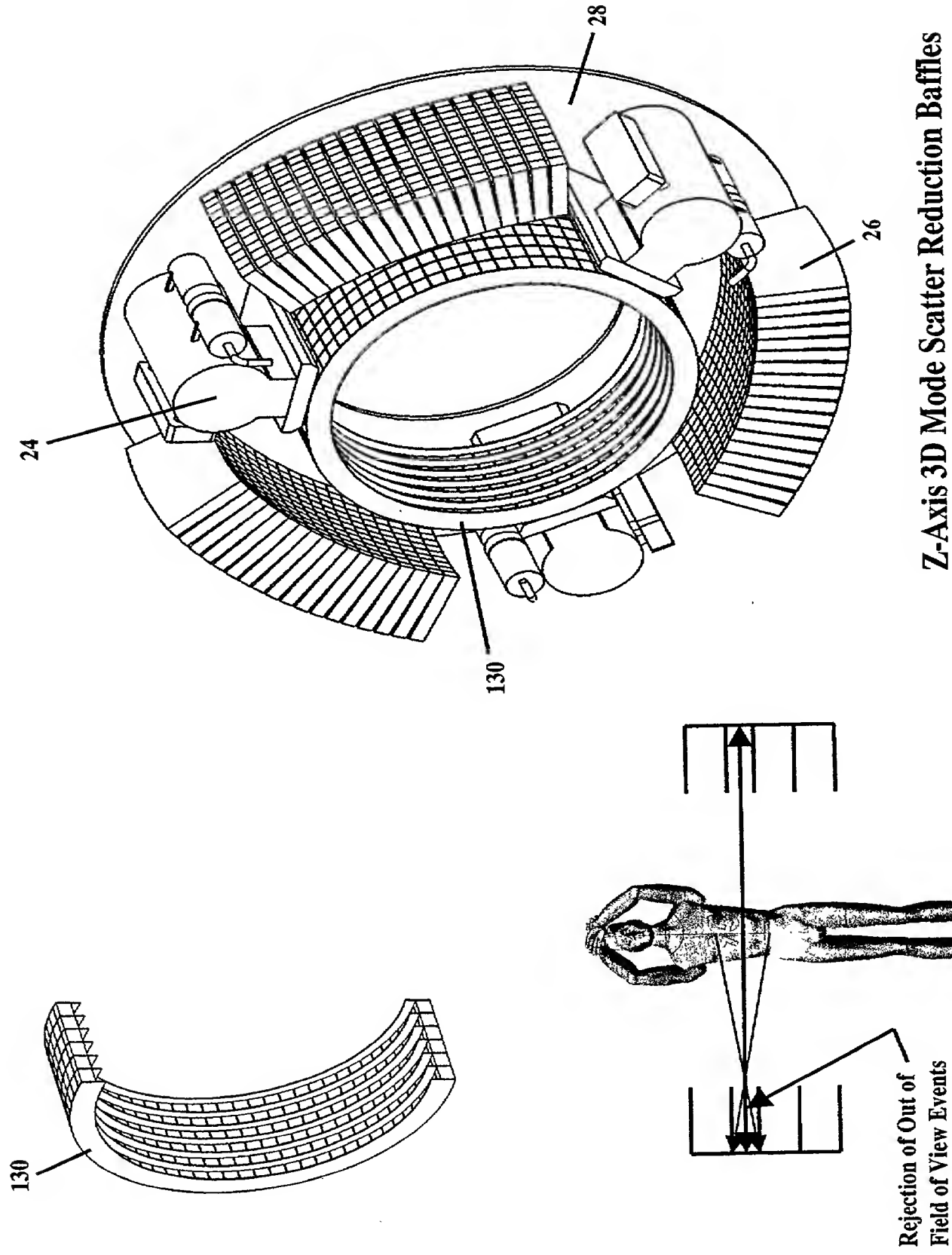


Figure 14

System With Cone Beam Focused NM/SPECT Collimation

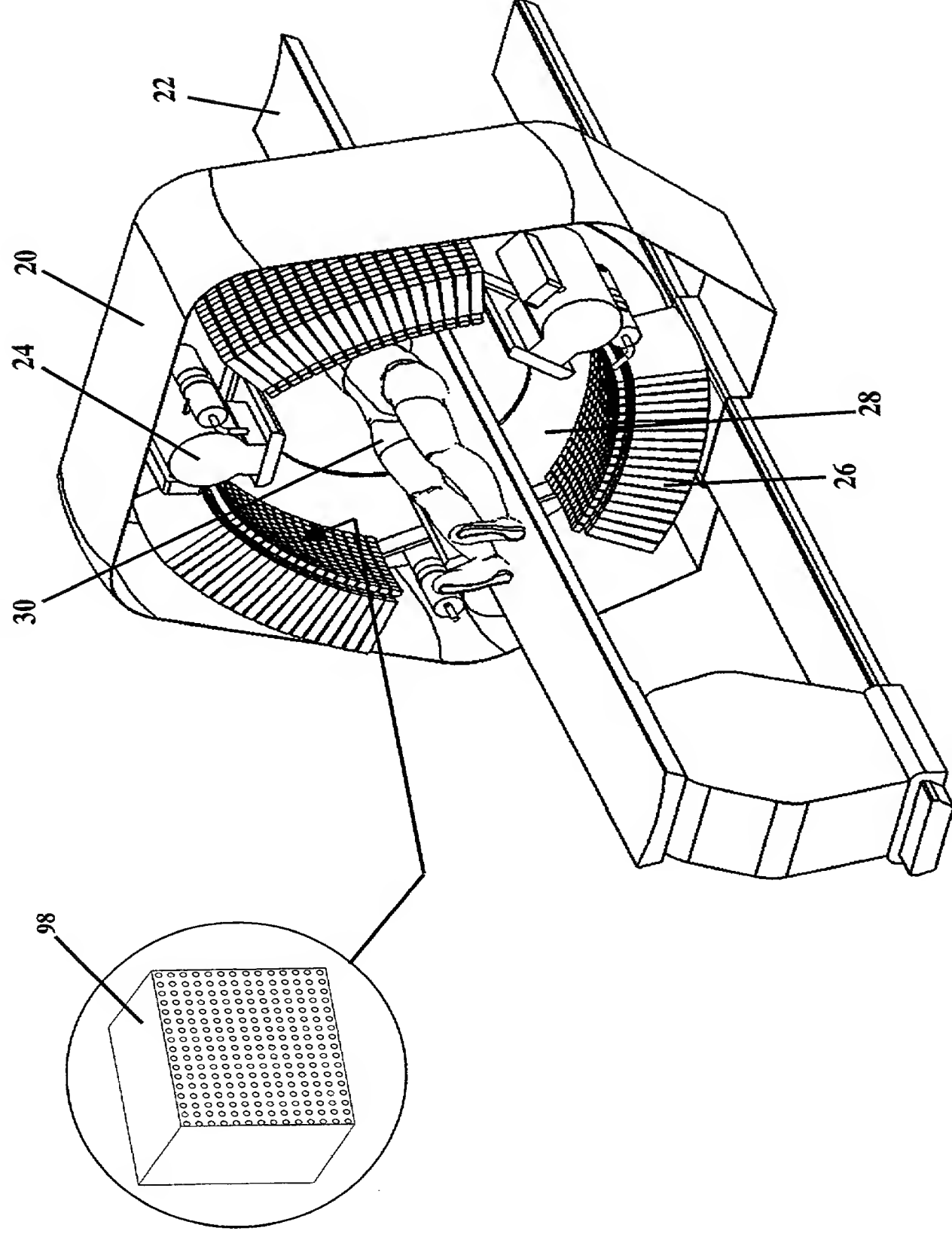


Figure 15

NM/SPECT Mode with Collimation Ring

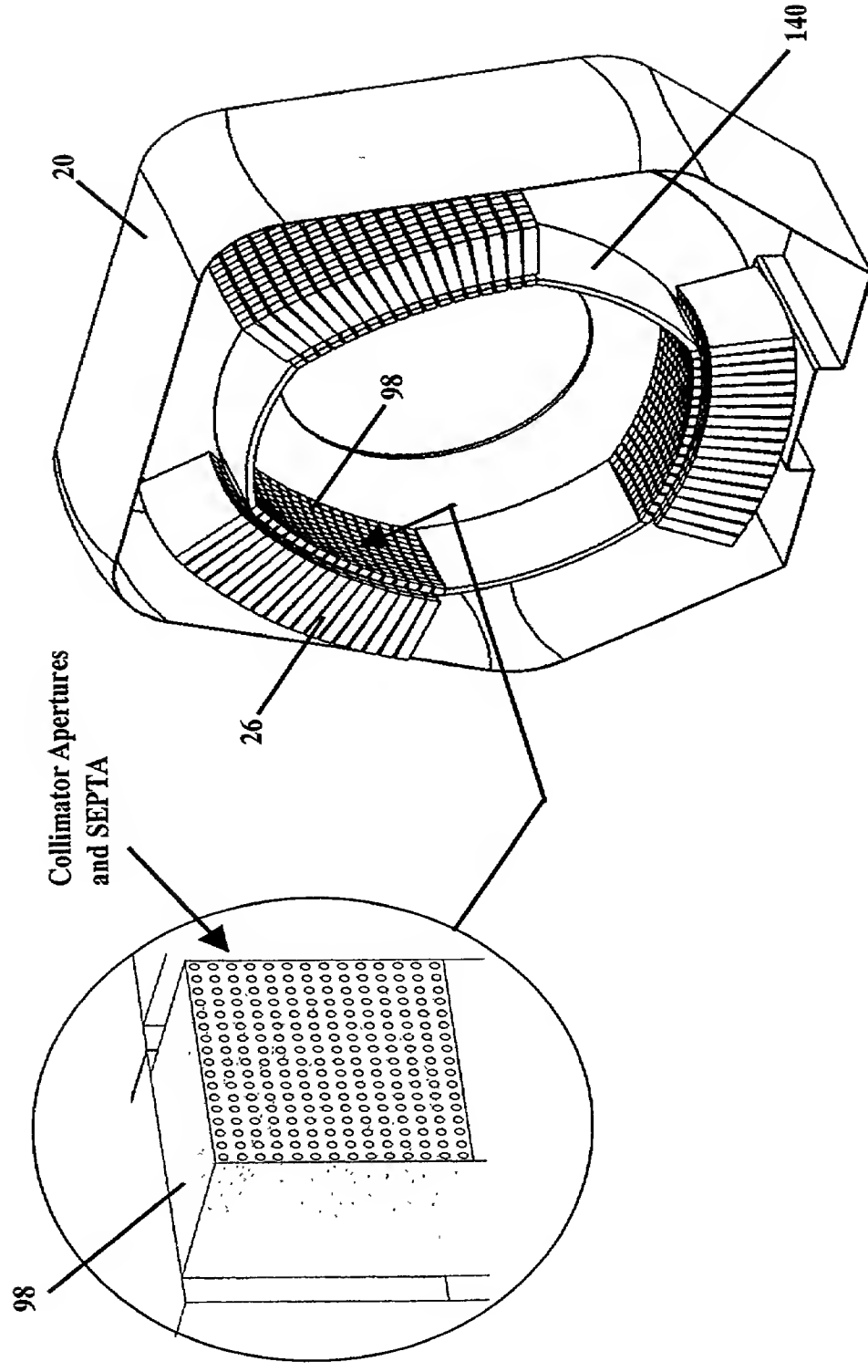


Figure 16

Cone Beam NM/SPECT LEHR Collimation and Focused 2D Curved

Detector Array

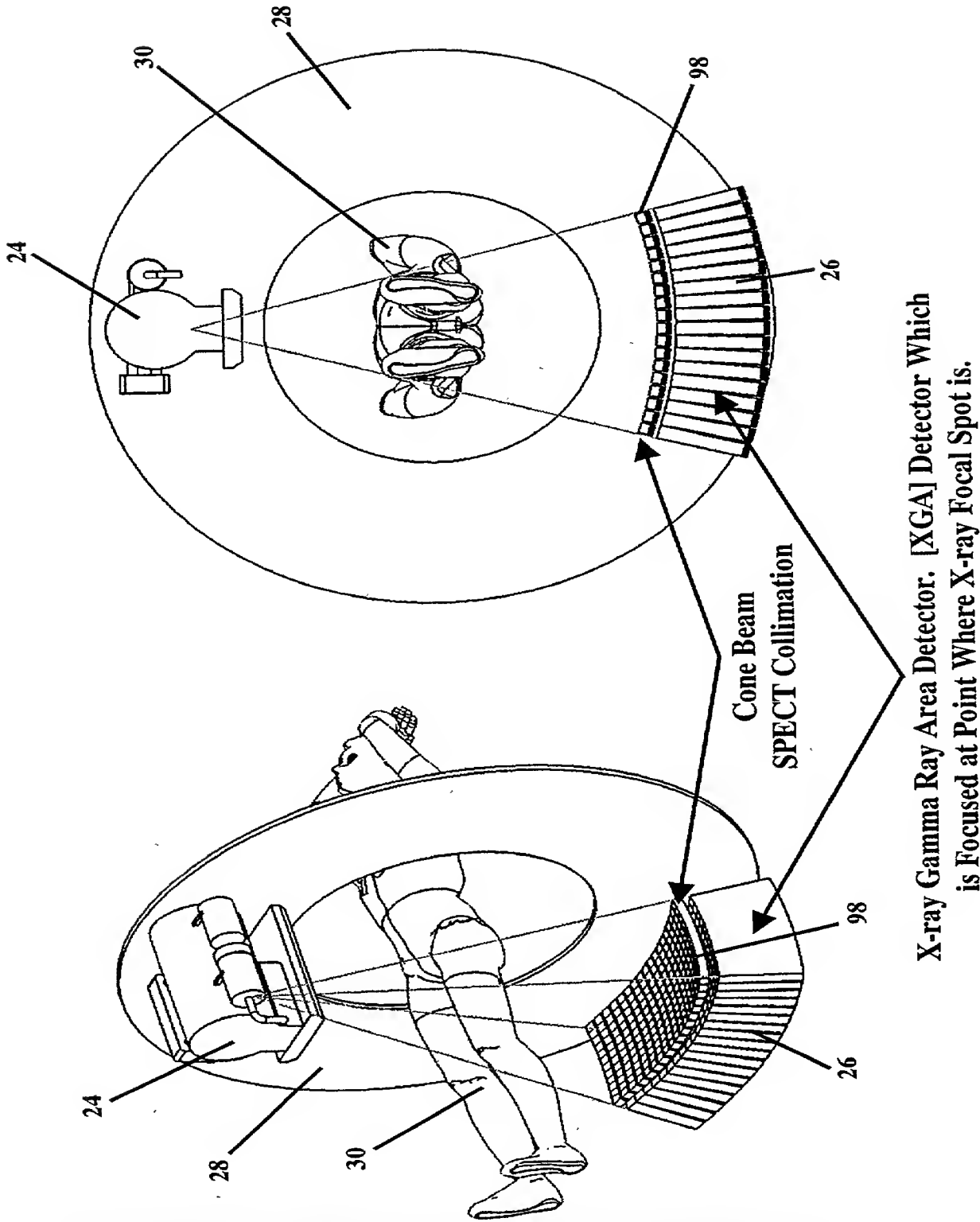
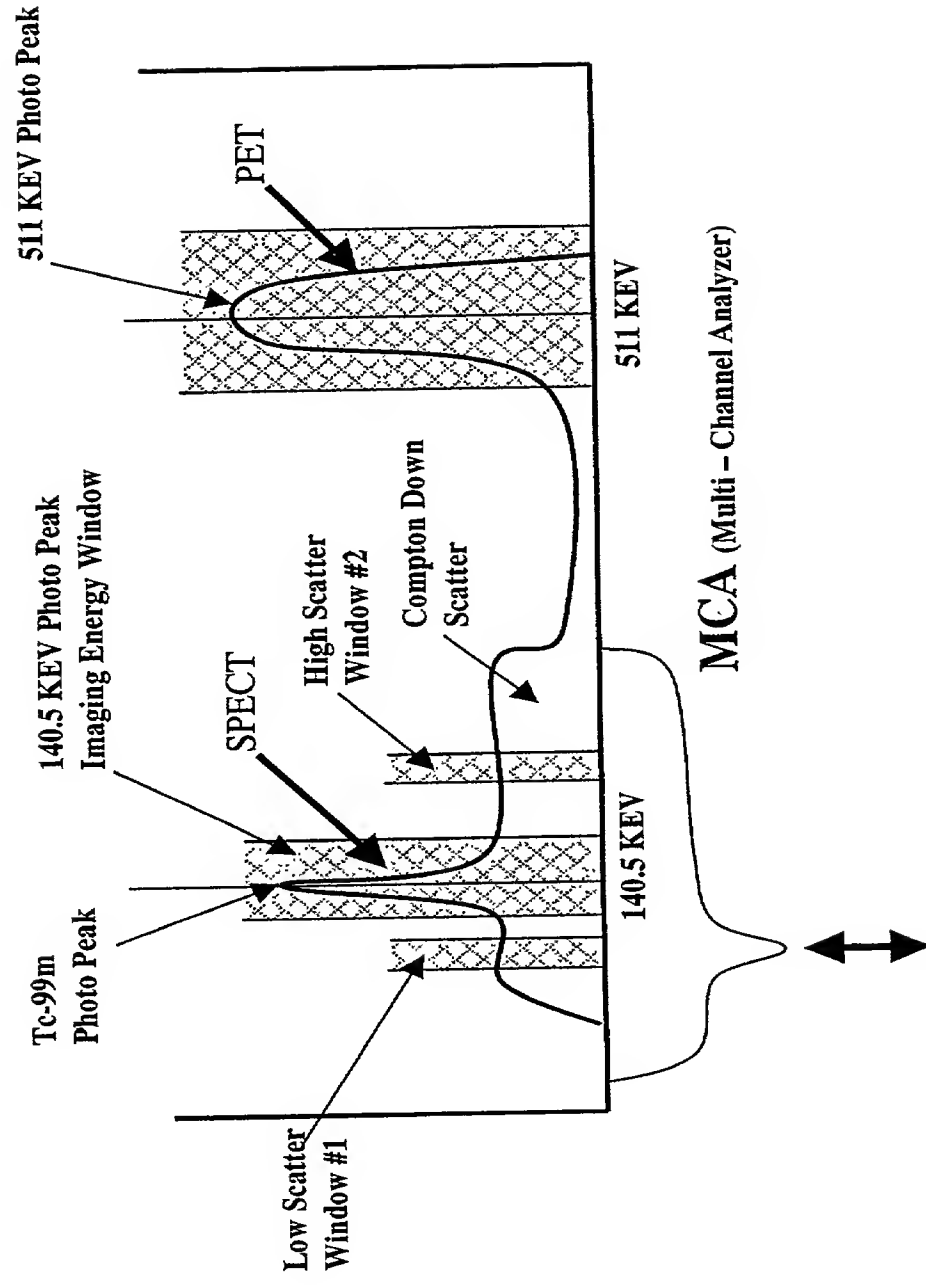


Figure 17

Multi-Isotope Scanning



- Scatter Correction and 511 KEV Photo Peak Suppression for SPECT Imaging
- NM/SPECT Detector Must Function with 511 KEV Isotope Present for Multi-Isotope Imaging

Figure 18

X-Ray Detector Scatter Rejection with Focused 2D Curved Collimation

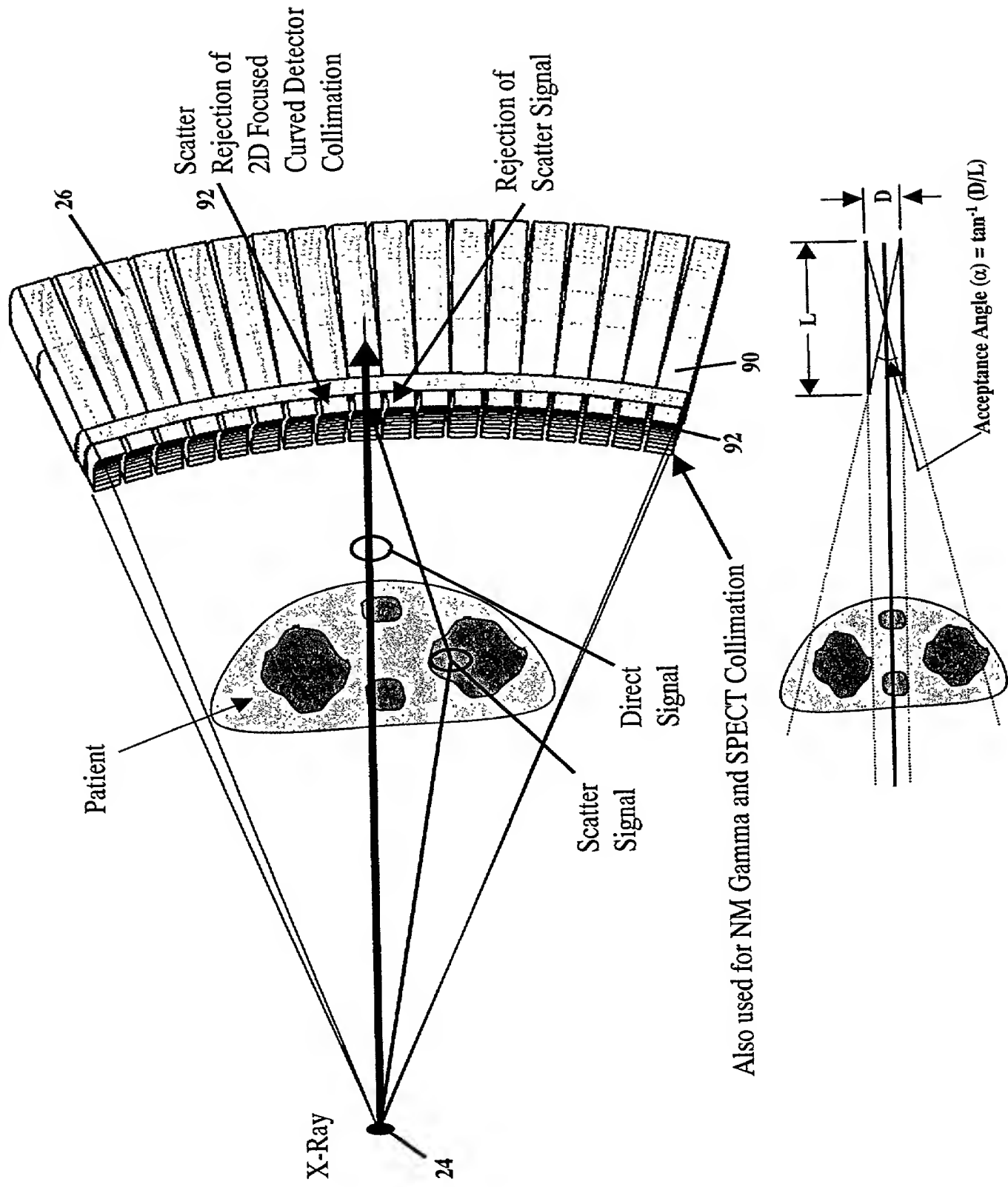


Figure 19

Sequencing of X-ray Sources for Adaptive Scatter Correction

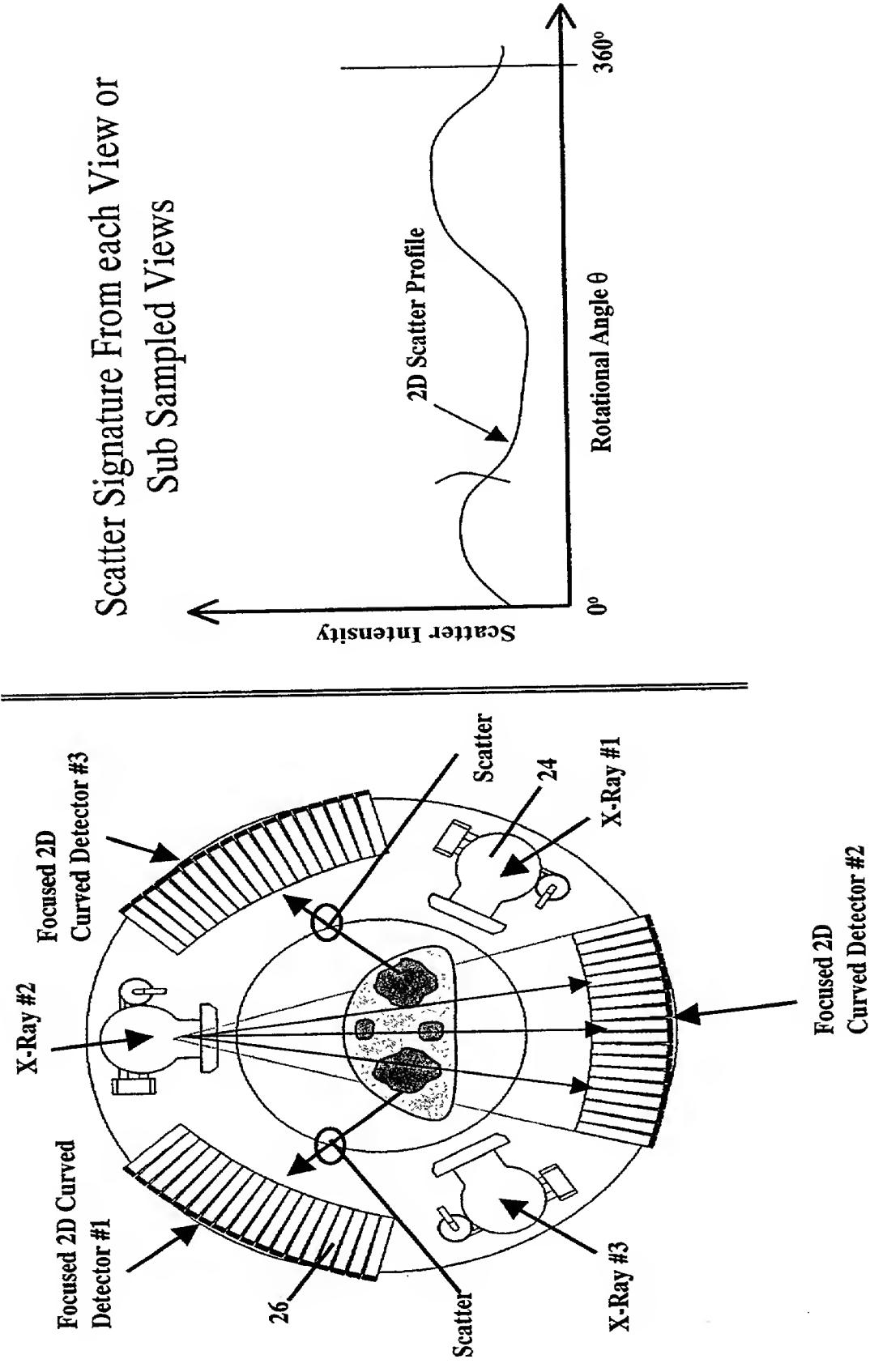


Figure 20

Modulation and Demodulation for Scatter Correction with Multiple Sources

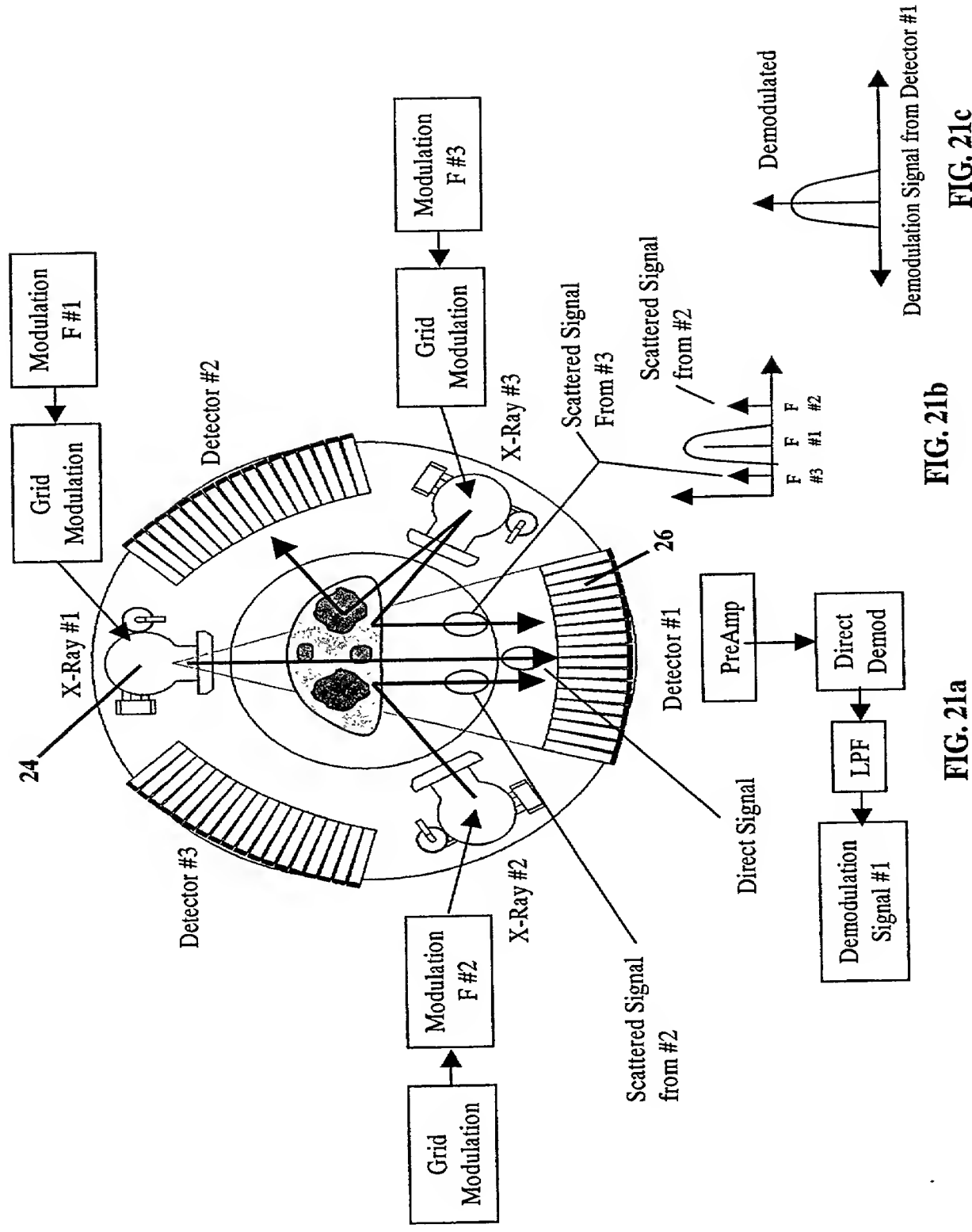


Figure 21

System Level Diagram of Modulation and Demodulation For Multiple Sources for VCT

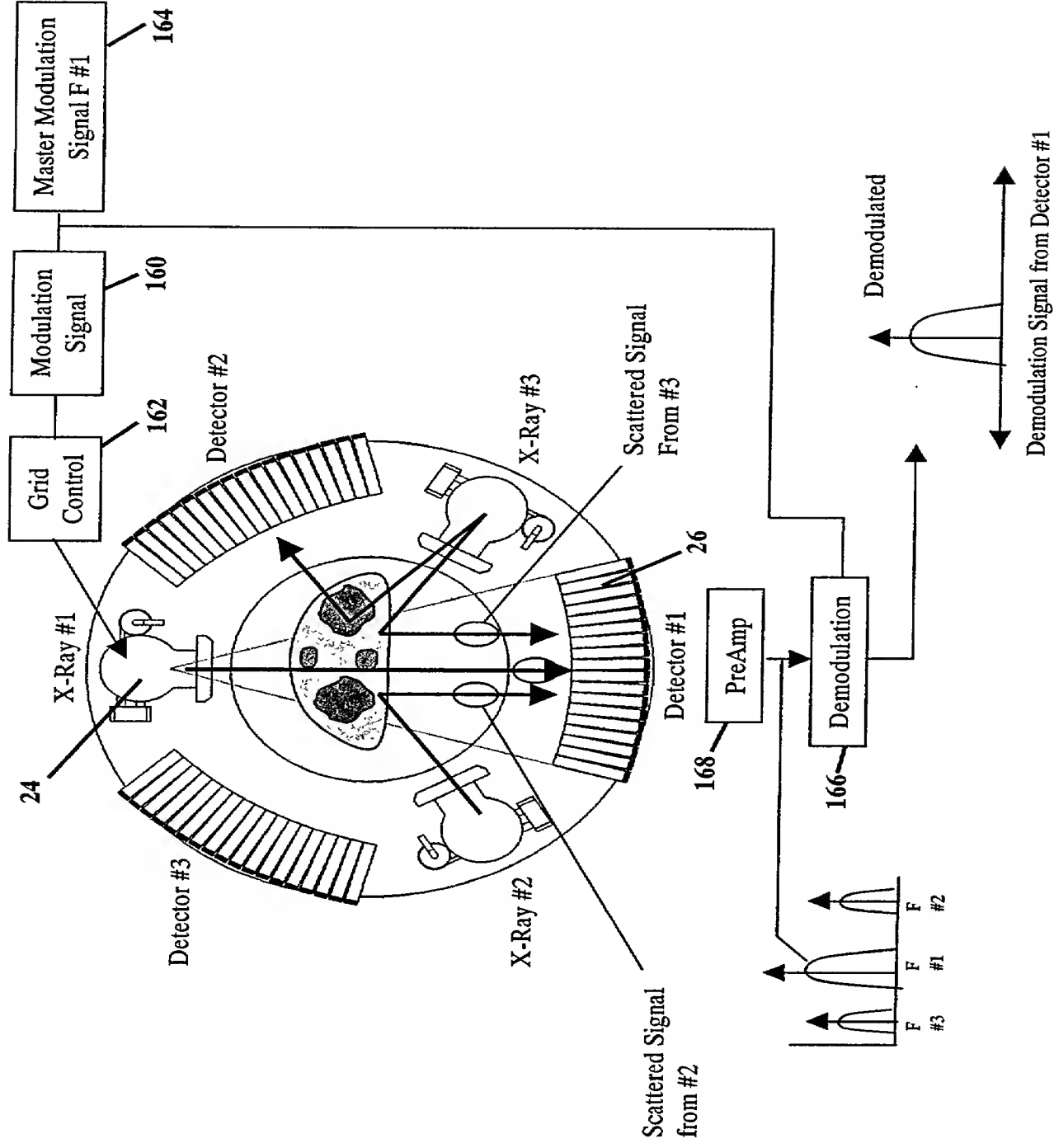


Figure 22

Step and Shoot VCT Imaging

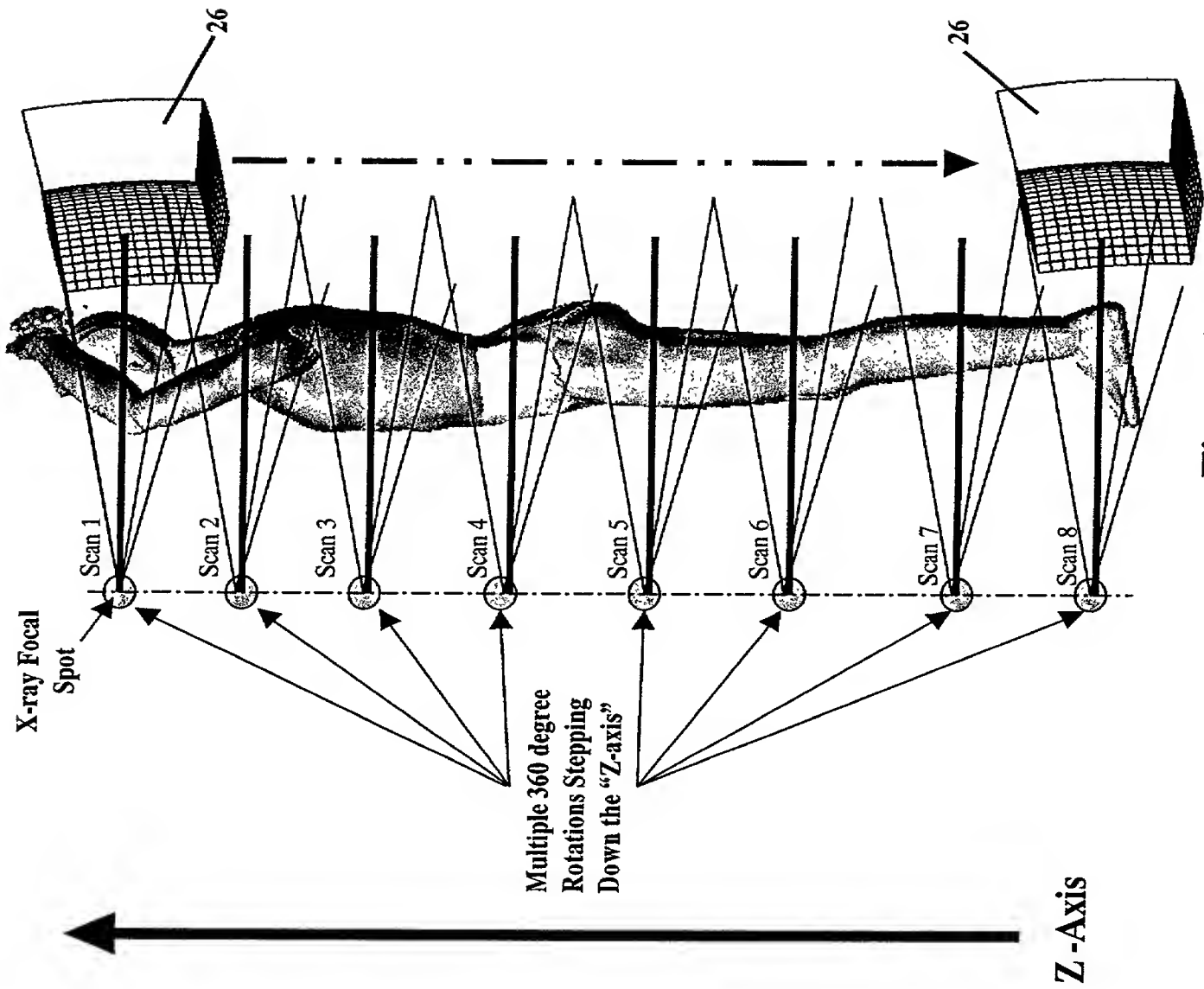
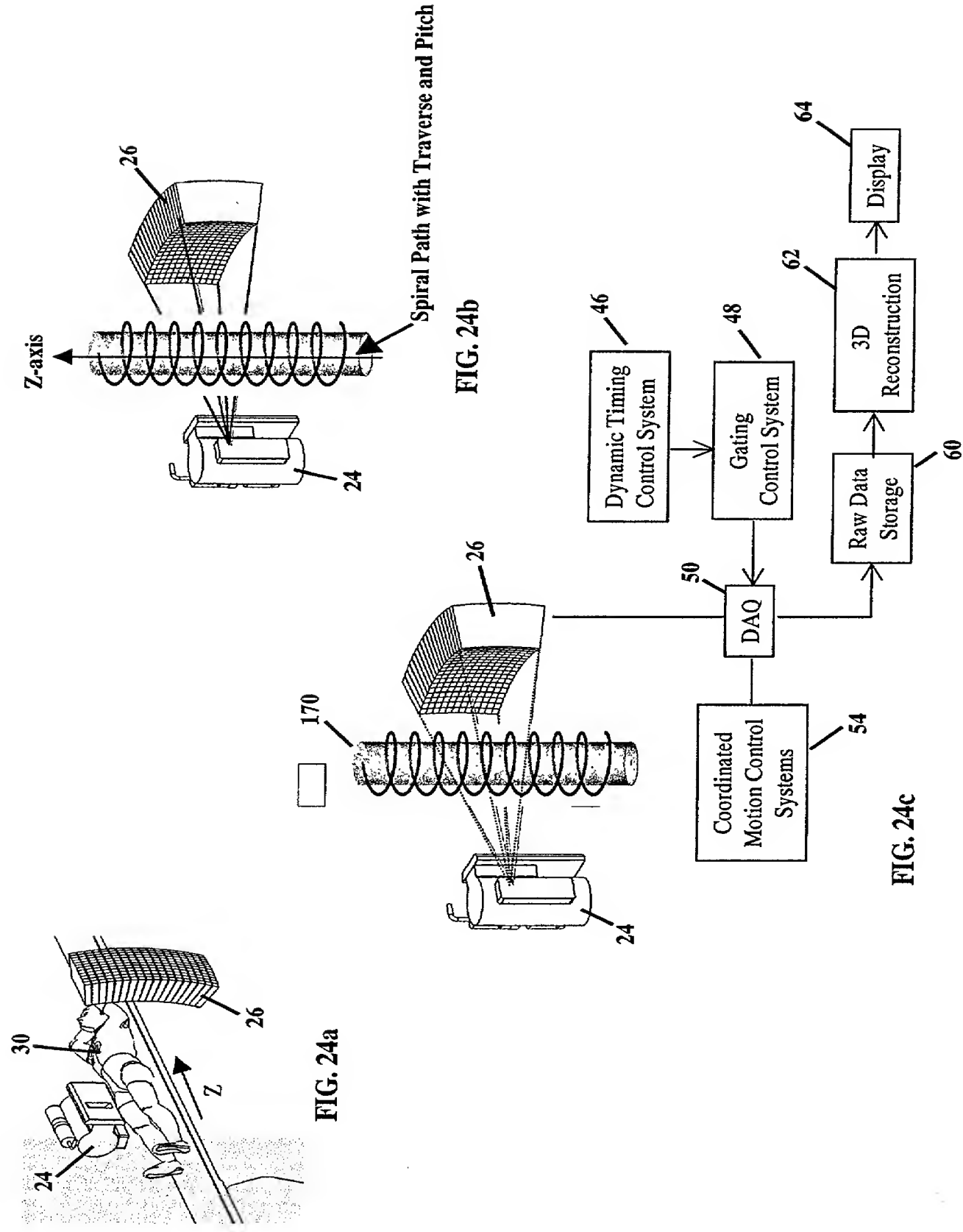


Figure 23

Spiral 3D X-Ray, DAQ and VCT for Cone Beam Reconstruction



Spiral VCT with Multiple Heads

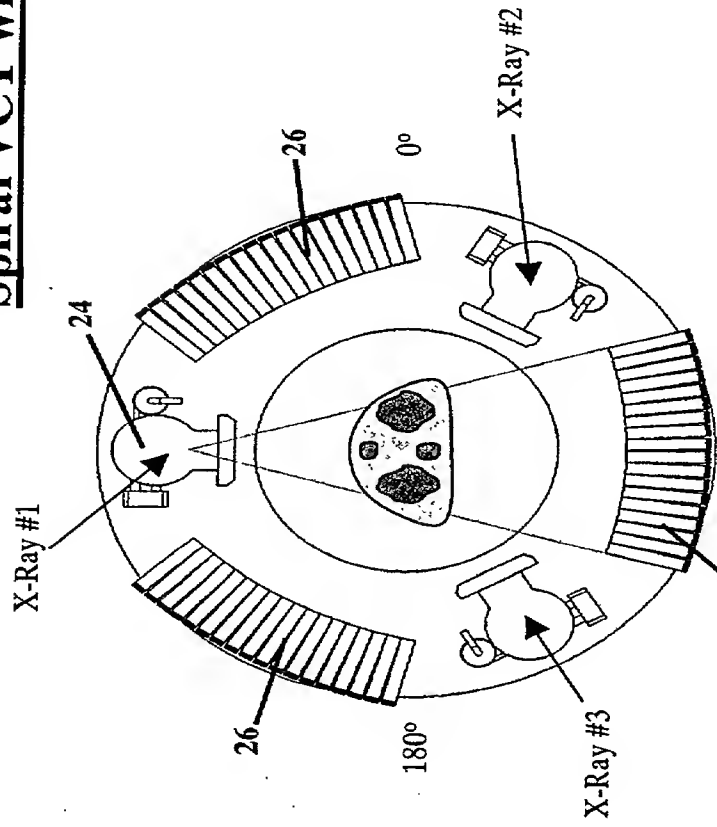
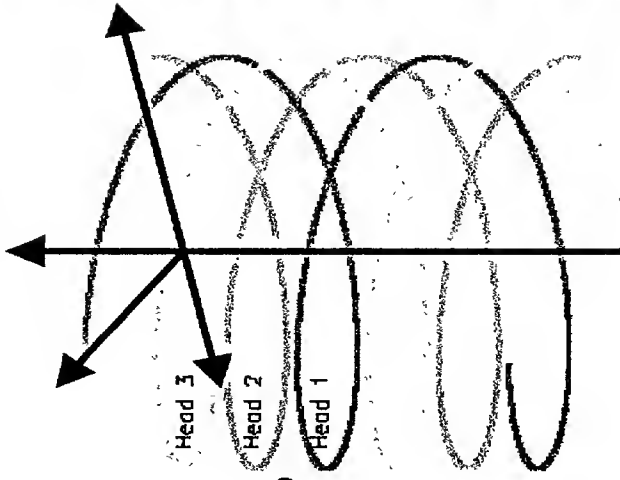


FIG. 25a



Spiral Path with 3 Heads with
respective Central Rays on
Reconstruction Cylinder

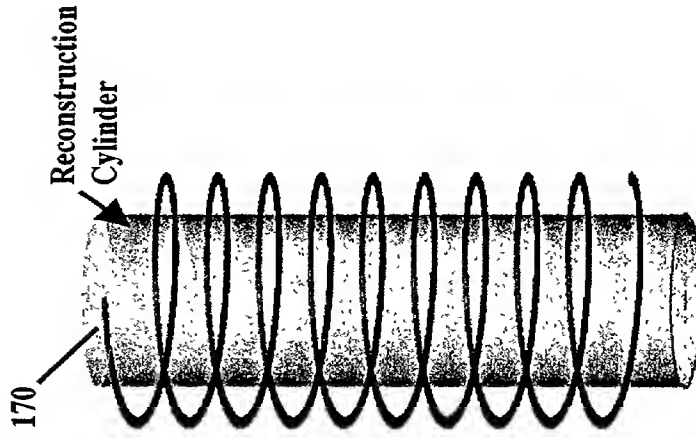


Figure 25

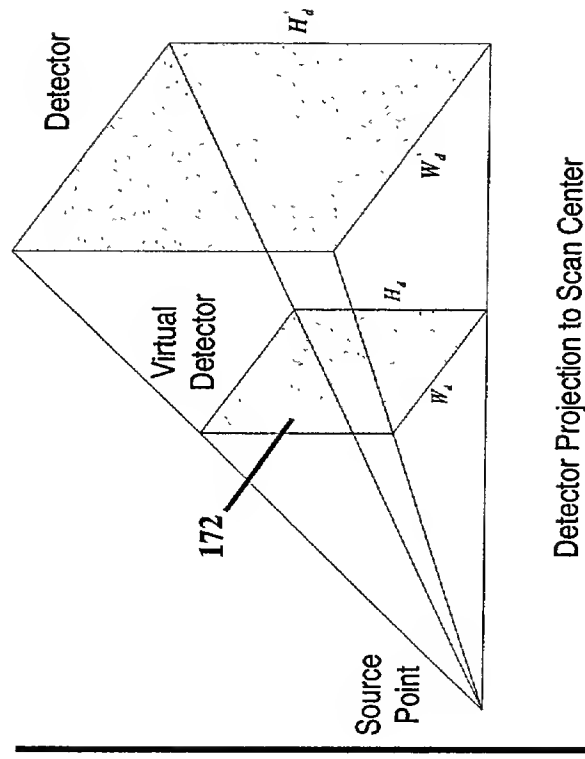


FIG. 25c

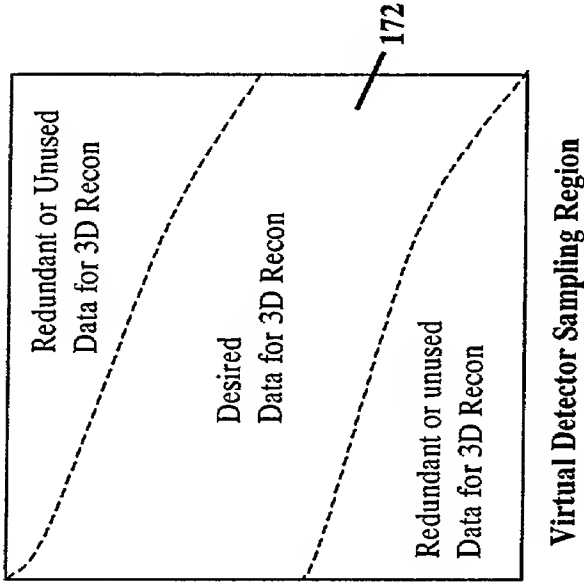


FIG. 25d

Cone Beam Slant Source Collimation for Spiral VCT Imaging

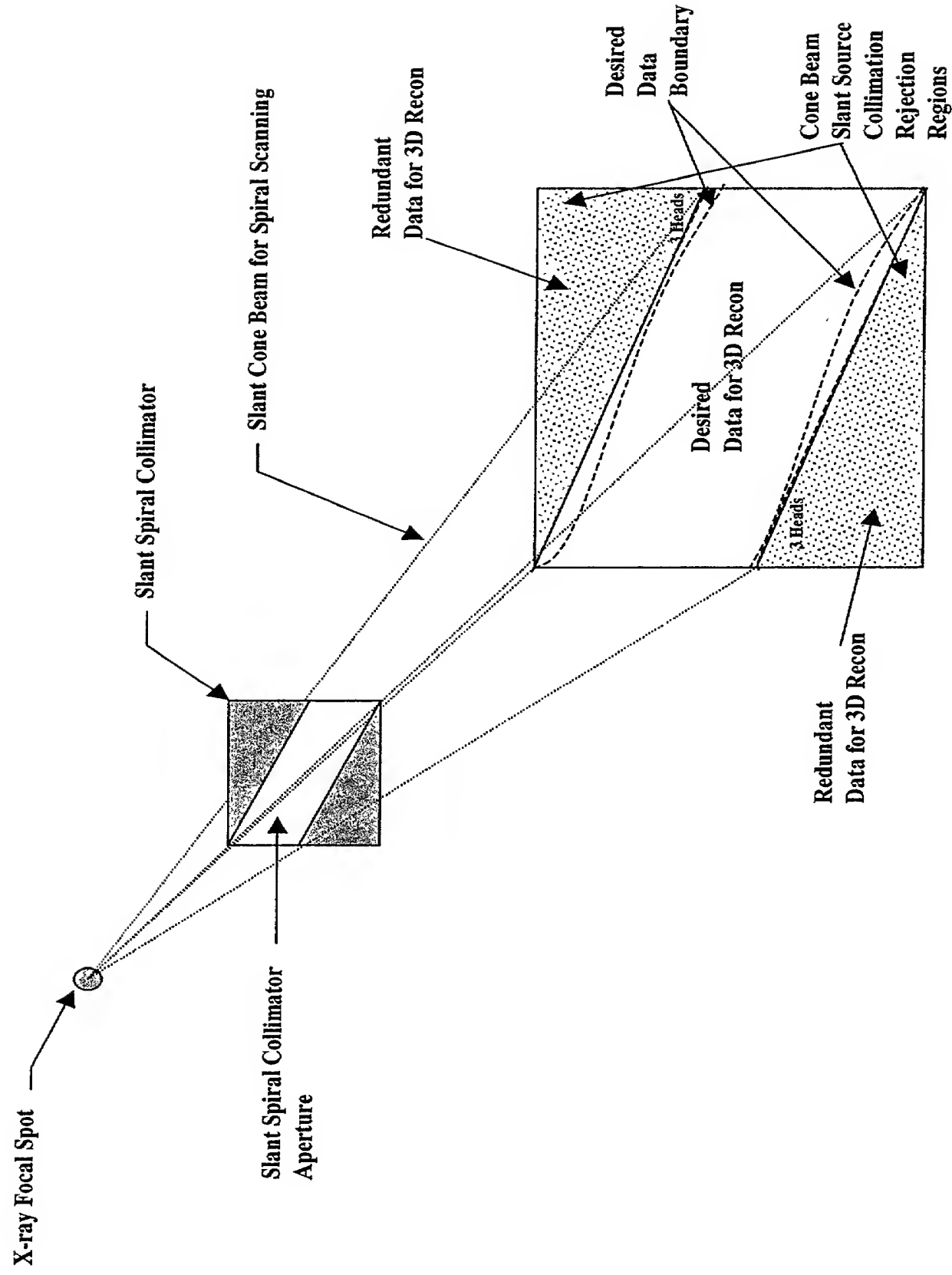


Figure 26

| Parameter | Value |
|------------|-------|
| α | 0.05 |
| β | 0.05 |
| γ | 0.05 |
| δ | 0.05 |
| ϵ | 0.05 |
| ζ | 0.05 |
| η | 0.05 |
| θ | 0.05 |
| ι | 0.05 |
| κ | 0.05 |
| λ | 0.05 |
| μ | 0.05 |
| ν | 0.05 |
| ξ | 0.05 |
| \omicron | 0.05 |
| π | 0.05 |
| ρ | 0.05 |
| σ | 0.05 |
| τ | 0.05 |
| υ | 0.05 |
| ϕ | 0.05 |
| χ | 0.05 |
| ψ | 0.05 |
| ω | 0.05 |
| δ | 0.05 |
| ϵ | 0.05 |
| ζ | 0.05 |
| η | 0.05 |
| θ | 0.05 |
| ι | 0.05 |
| κ | 0.05 |
| λ | 0.05 |
| μ | 0.05 |
| ν | 0.05 |
| ξ | 0.05 |
| \omicron | 0.05 |
| π | 0.05 |
| ρ | 0.05 |
| σ | 0.05 |
| τ | 0.05 |
| υ | 0.05 |
| ϕ | 0.05 |
| χ | 0.05 |
| ψ | 0.05 |
| ω | 0.05 |
| δ | 0.05 |
| ϵ | 0.05 |
| ζ | 0.05 |
| η | 0.05 |
| θ | 0.05 |
| ι | 0.05 |
| κ | 0.05 |
| λ | 0.05 |
| μ | 0.05 |
| ν | 0.05 |
| ξ | 0.05 |
| \omicron | 0.05 |
| π | 0.05 |
| ρ | 0.05 |
| σ | 0.05 |
| τ | 0.05 |
| υ | 0.05 |
| ϕ | 0.05 |
| χ | 0.05 |
| ψ | 0.05 |
| ω | 0.05 |
| δ | 0.05 |
| ϵ | 0.05 |
| ζ | 0.05 |
| η | 0.05 |
| θ | 0.05 |
| ι | 0.05 |
| κ | 0.05 |
| λ | 0.05 |
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| ν | 0.05 |
| ξ | 0.05 |
| \omicron | 0.05 |
| π | 0.05 |
| ρ | 0.05 |
| σ | 0.05 |
| τ | 0.05 |
| υ | 0.05 |
| ϕ | 0.05 |
| χ | 0.05 |
| ψ | 0.05 |
| ω | 0.05 |
| δ | 0.05 |
| ϵ | 0.05 |
| ζ | 0.05 |
| η | 0.05 |
| θ | 0.05 |
| ι | 0.05 |
| κ | 0.05 |
| λ | 0.05 |
| μ | 0.05 |
| ν | 0.05 |
| ξ | 0.05 |
| \omicron | 0.05 |
| π | 0.05 |
| ρ | 0.05 |
| σ | 0.05 |
| τ | 0.05 |
| υ | 0.05 |
| ϕ | 0.05 |
| χ | 0.05 |
| ψ | 0.05 |
| ω | 0.05 |
| δ | 0.05 |
| ϵ | 0.05 |
| ζ | 0.05 |
| η | 0.05 |
| θ | 0.05 |
| ι | 0.05 |
| κ | 0.05 |
| λ | 0.05 |
| μ | 0.05 |
| ν | 0.05 |
| ξ | 0.05 |
| \omicron | 0.05 |
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| ϕ | 0.05 |
| χ | 0.05 |
| ψ | 0.05 |
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| κ | 0.05 |
| λ | 0.05 |
| μ | 0.05 |
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| ξ | 0.05 |
| \omicron | 0.05 |
| π | 0.05 |
| ρ | 0.05 |
| σ | 0.05 |

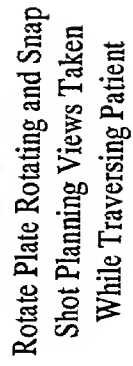


Figure 27

Whole Body Dose Control From Planning System

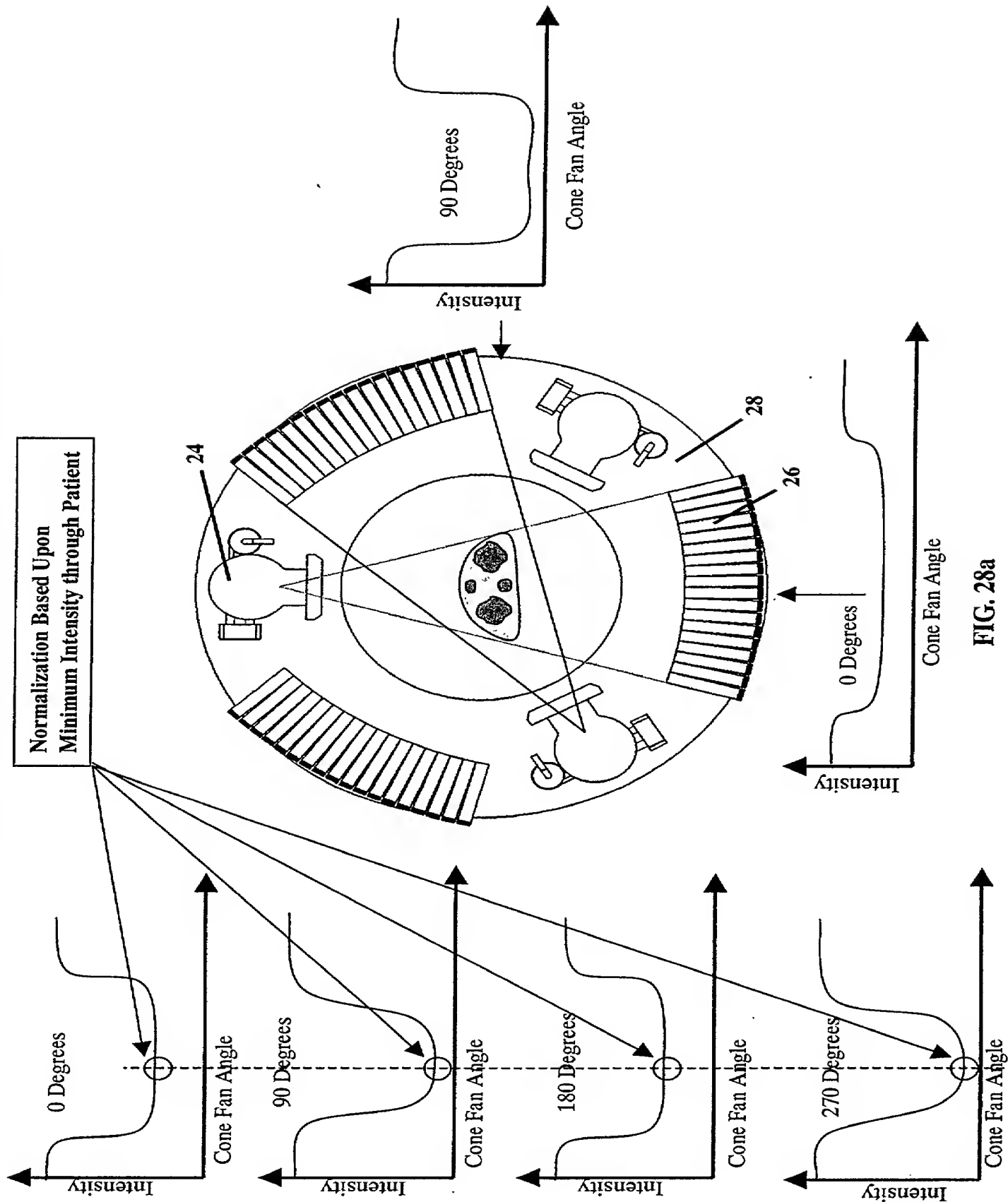


FIG. 28a

Figure 28

FIG. 28b

Dynamic Timing Control

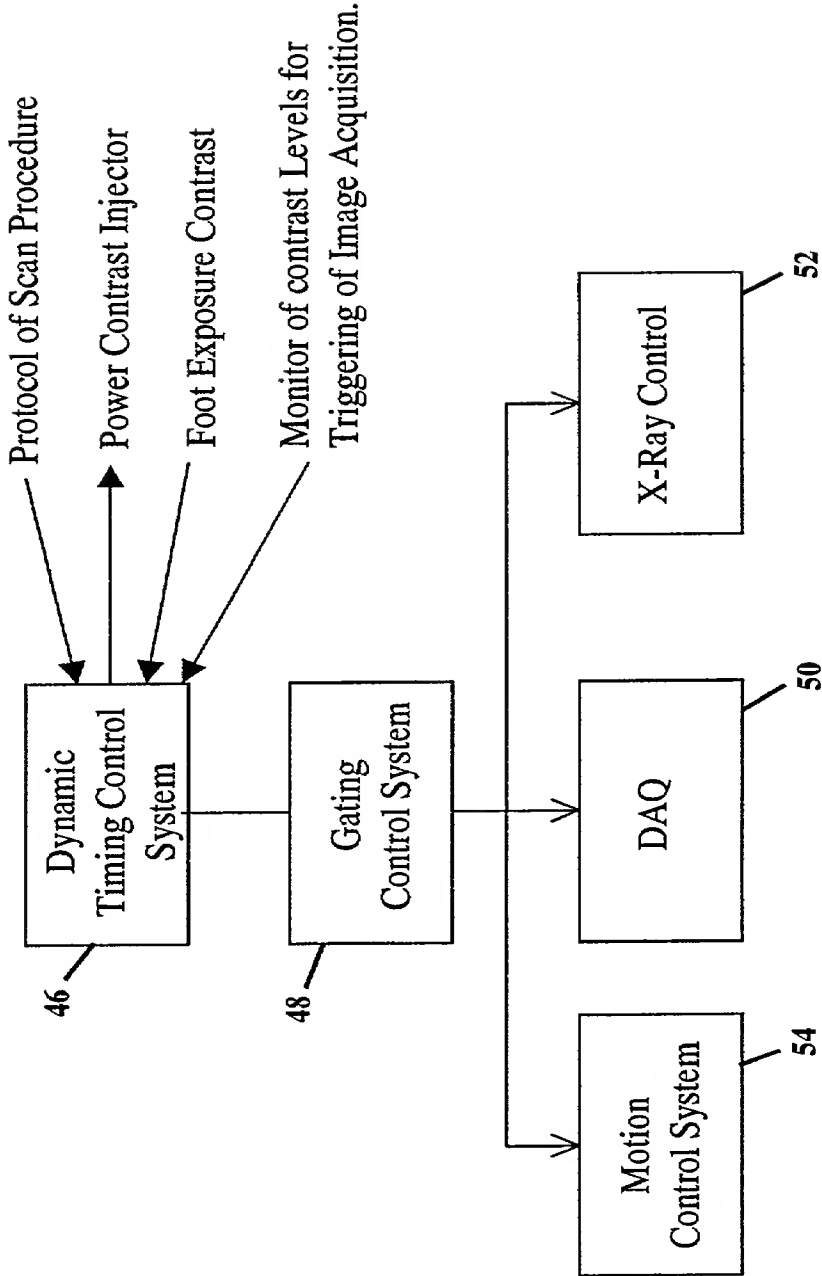


Figure 29

Retrospective Gated Imaging System

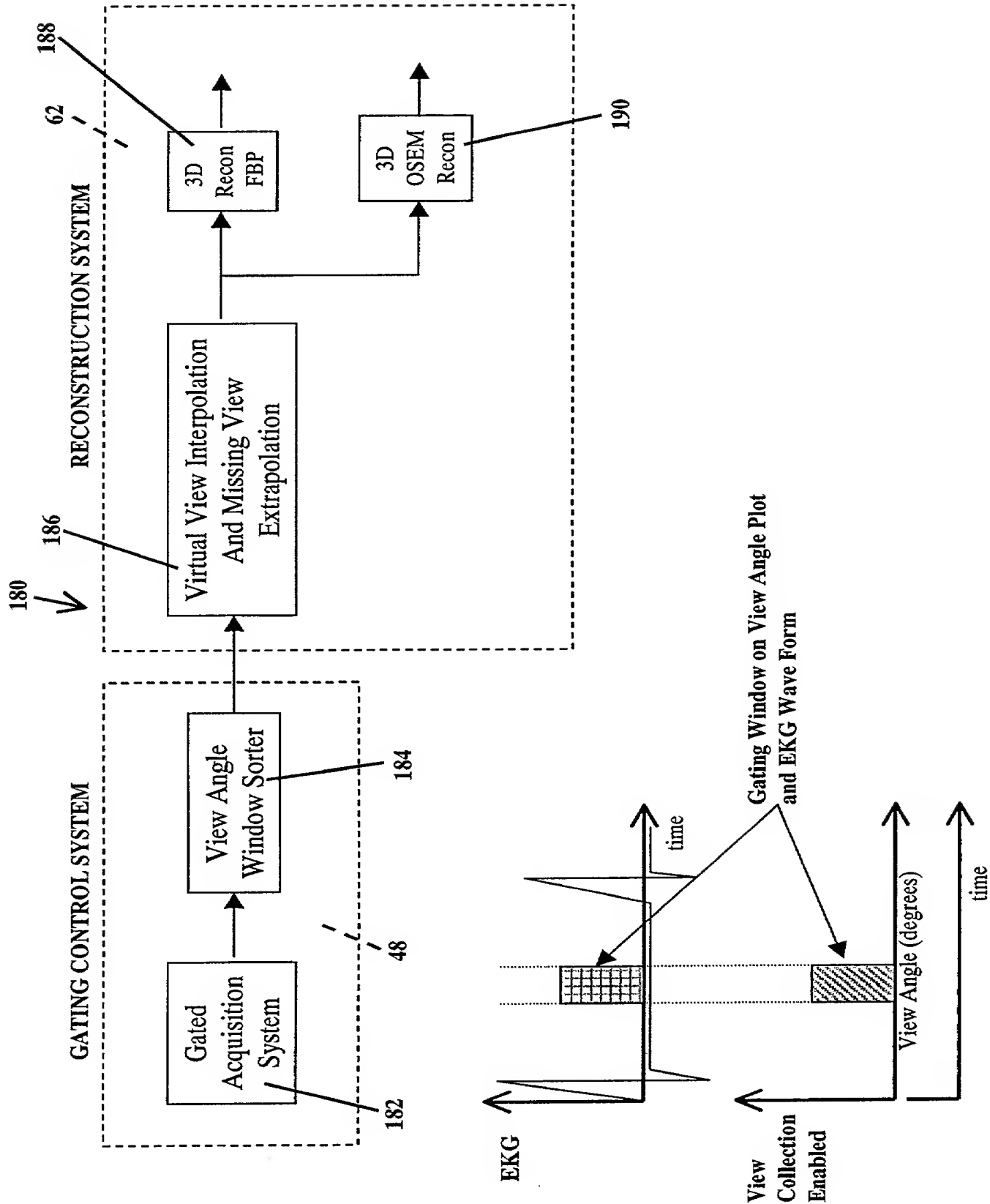
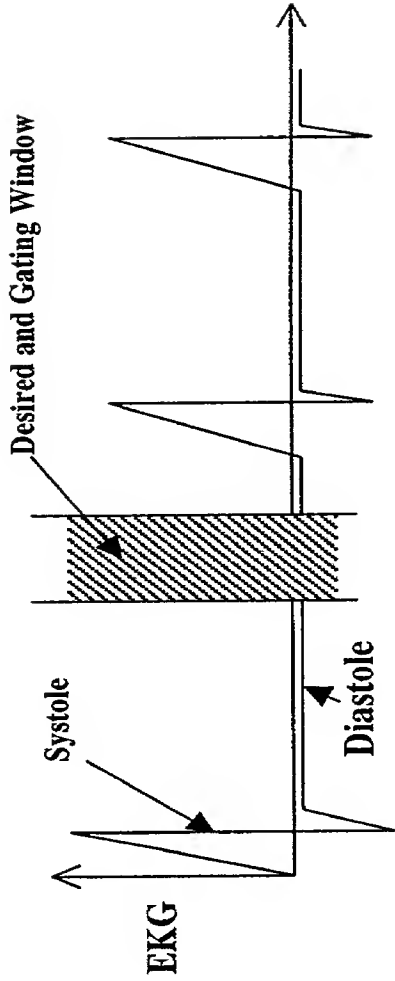


Figure 30

Prospective Gating Control System with Cardiac EKG



Heart Rate: 60 bpm

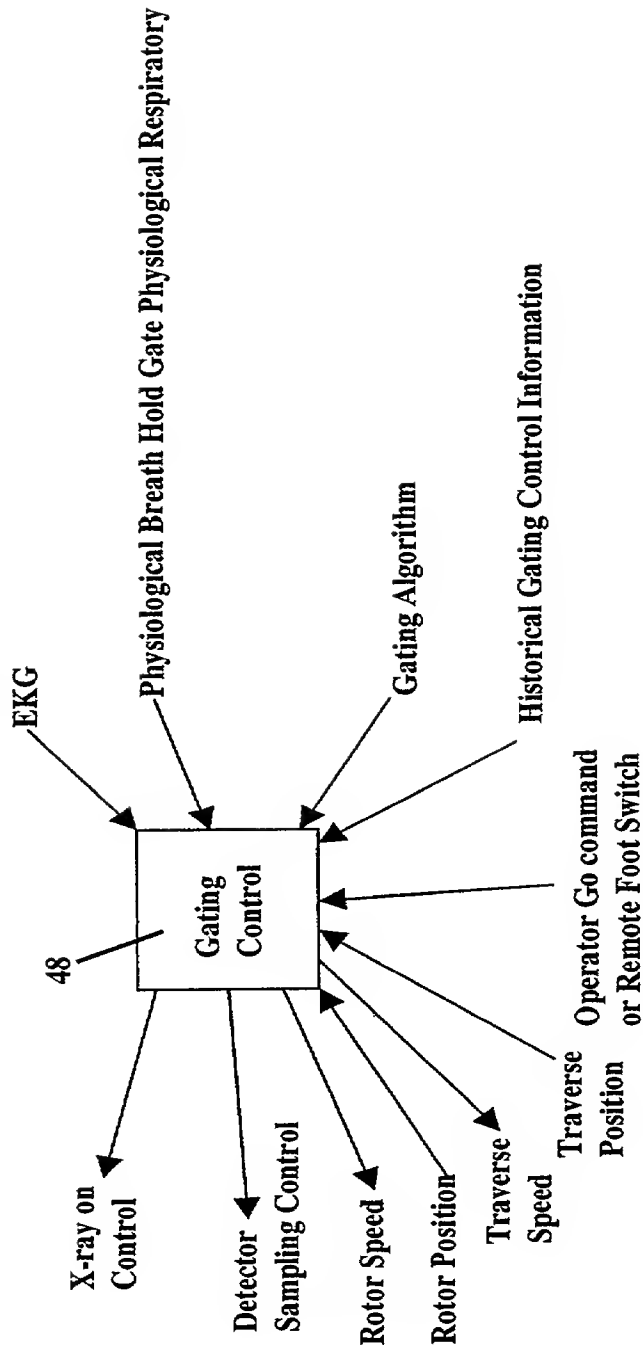


Figure 31

Prospective and Retrospective Gated DAQ and Reconstruction Imaging

Prospective Gating Control

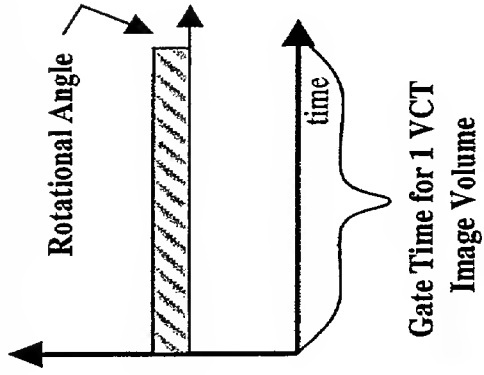


FIG. 32a

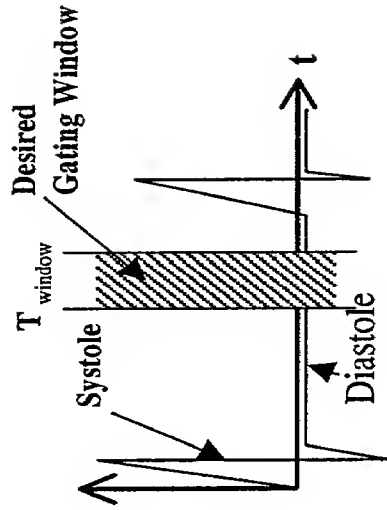
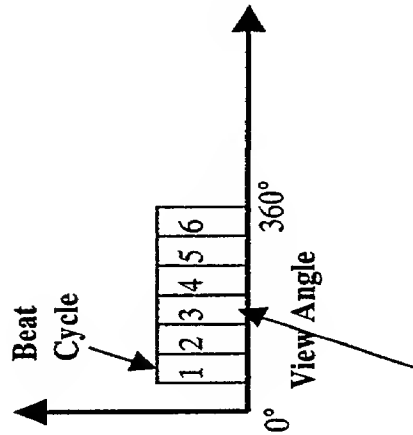


FIG. 32b

Retrospective Gating Control



Multiple cardiac cycles to fill needed Views. Collect all views in (n) cycles of Heart.

FIG. 32c

Multi Cycle – Contiguous

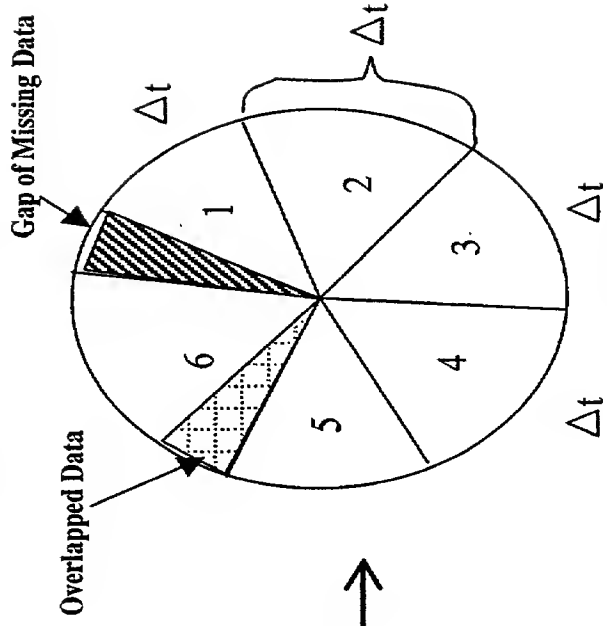


FIG. 32e

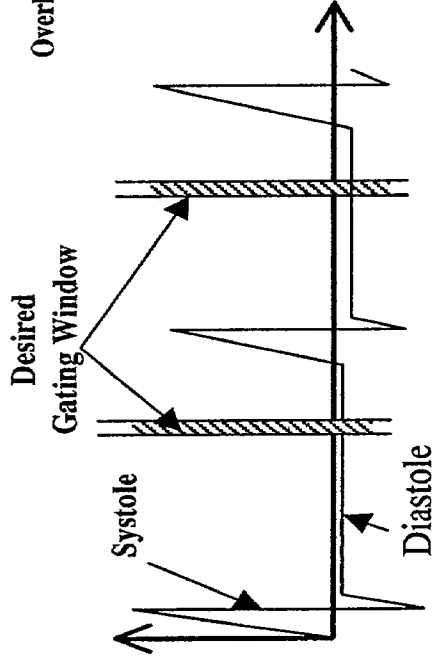


FIG. 32d

Figure 32

Gated DAQ and Reconstruction for Retrospective Cine 'Dynamic Cardiac Imaging

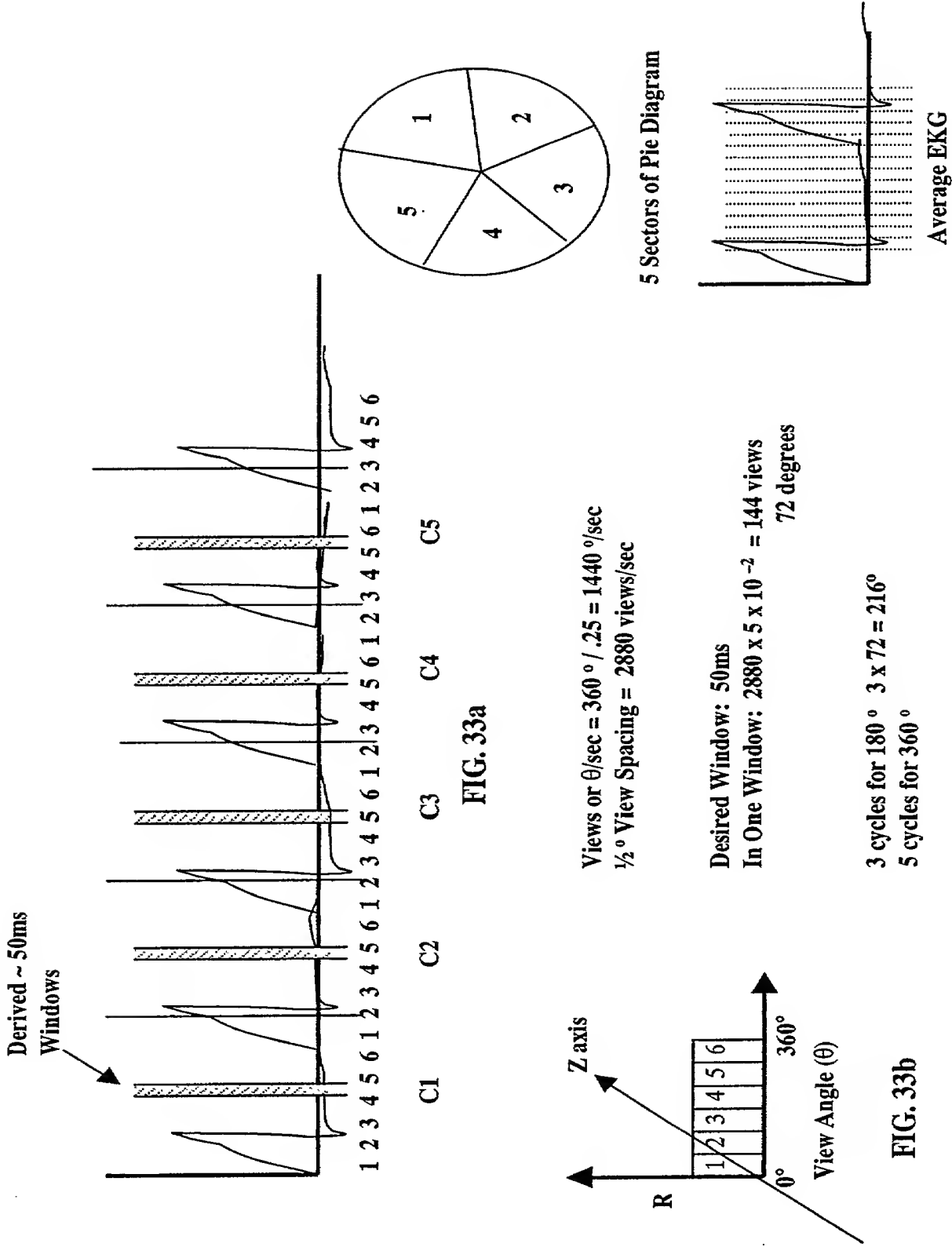
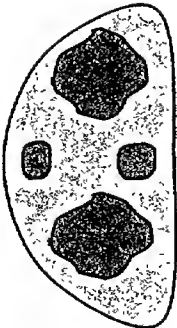


Figure 33

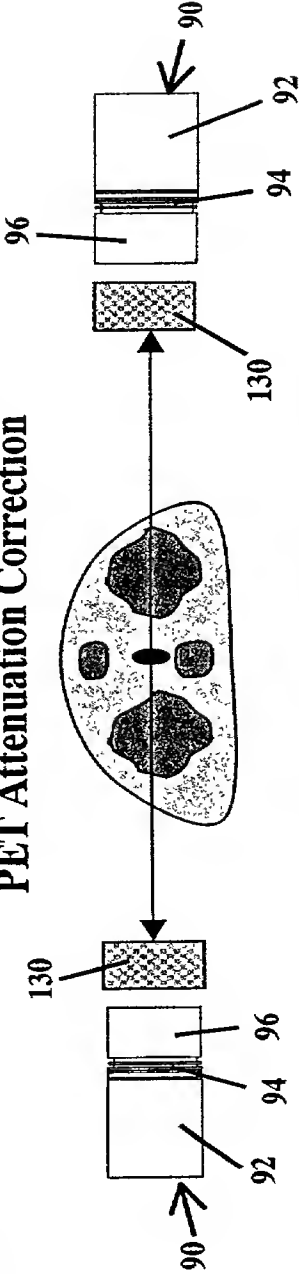
PET Transmission, Attenuation & Scatter Correction

VCT Attenuation MAP



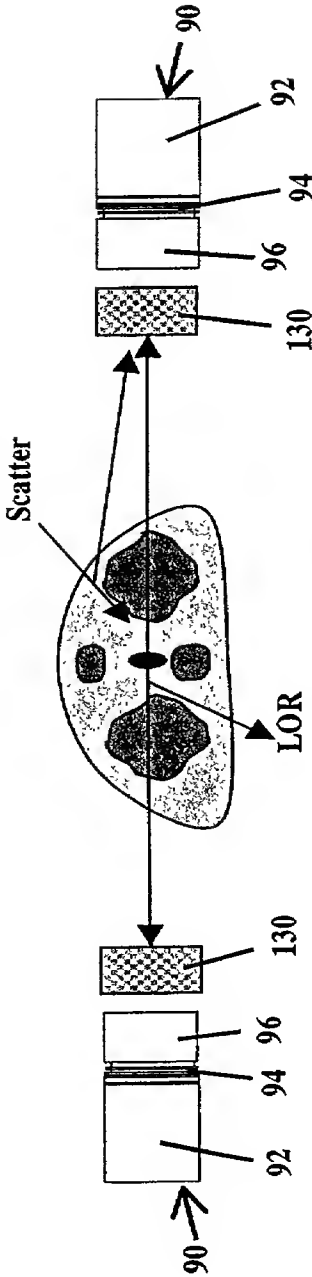
Transmission Attenuation
Map at 511 KEV Energy Level from VCT Images

PET Attenuation Correction



Correction Map for PET New Corrected PET
Projections for OSEM Recon.

PET Scatter Correction



Scatter Correction from VCT Images and
Count Rates on a Projection View Basis

Figure 34

NM/SPECT Transmission, Attenuation & Scatter Correction

VCT Attenuation MAP

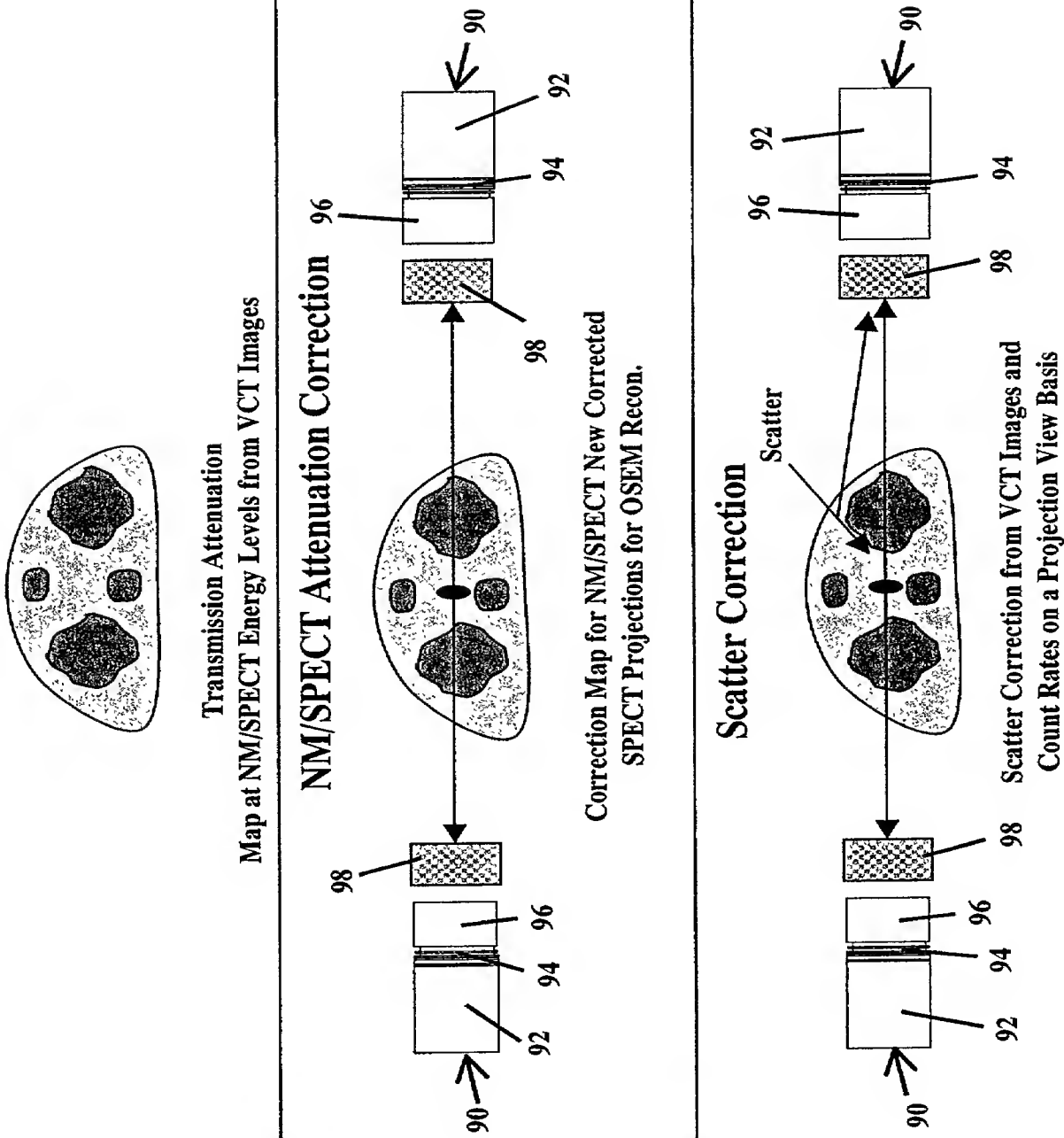


Figure 35

Patient Fused Multi-Modality Imaging and Analysis System

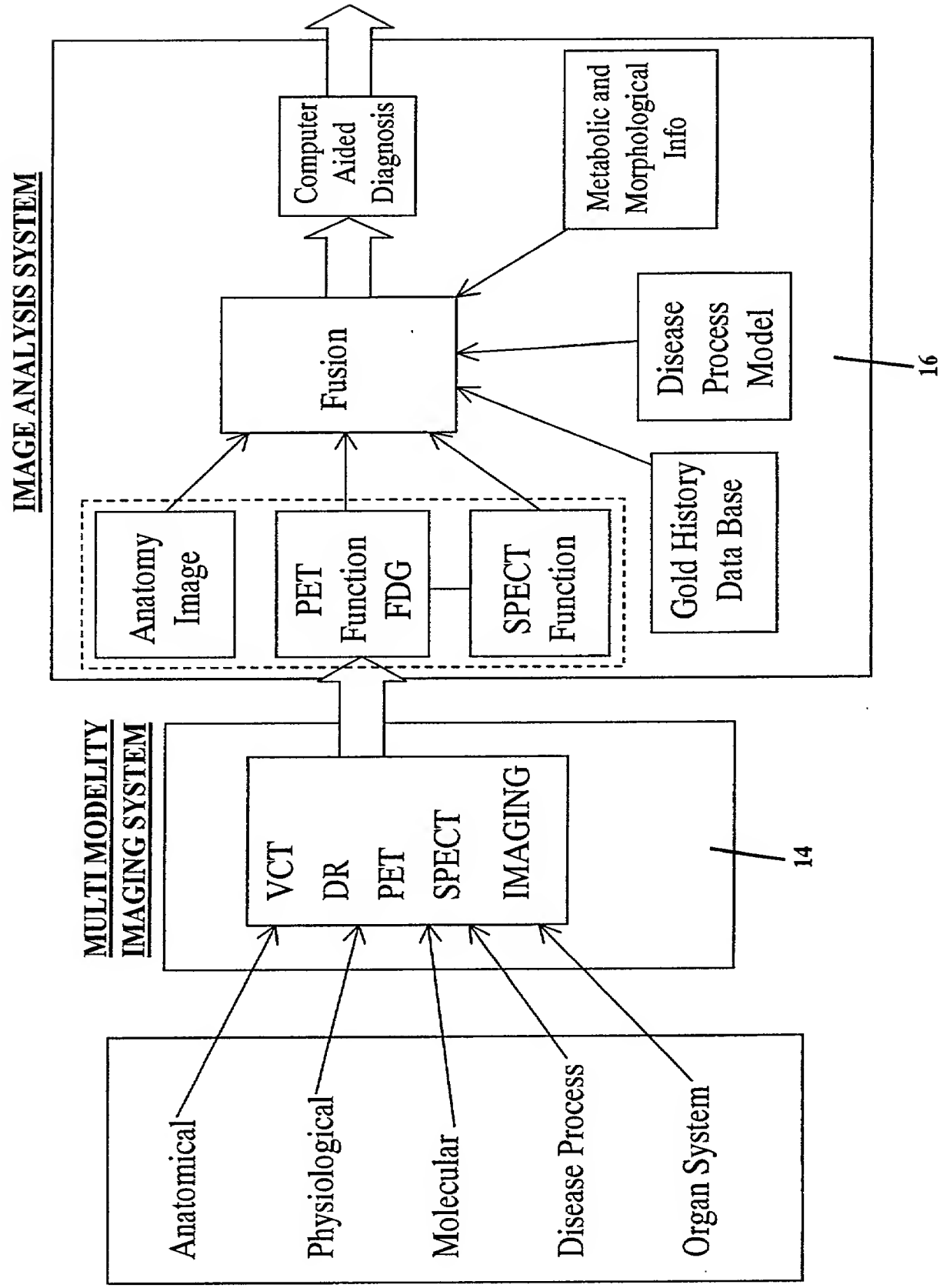


Figure 36

Interventional Image Control System

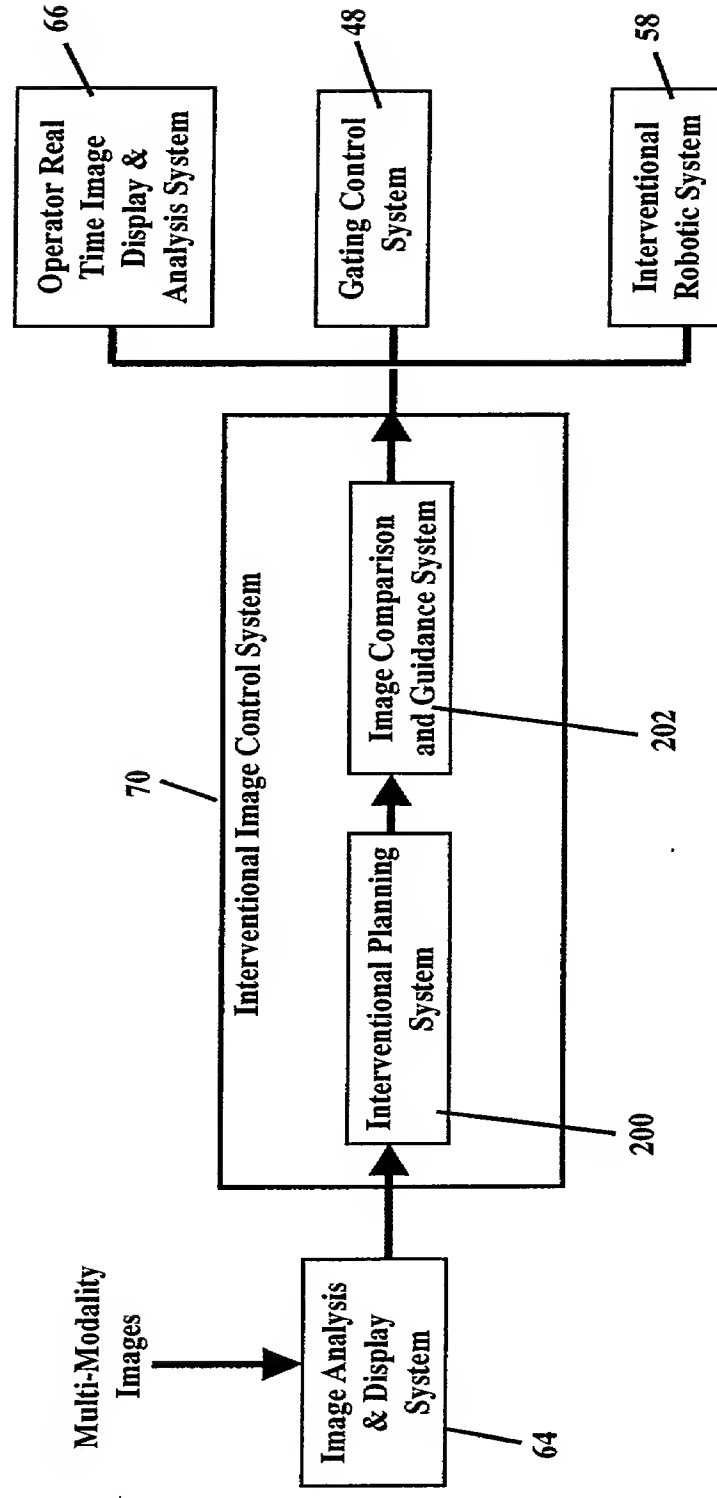


Figure 37

**Multi-Modality Imaging with Independent X-Ray VCT, PET, and
NM/SPECT Image Acquisition System**

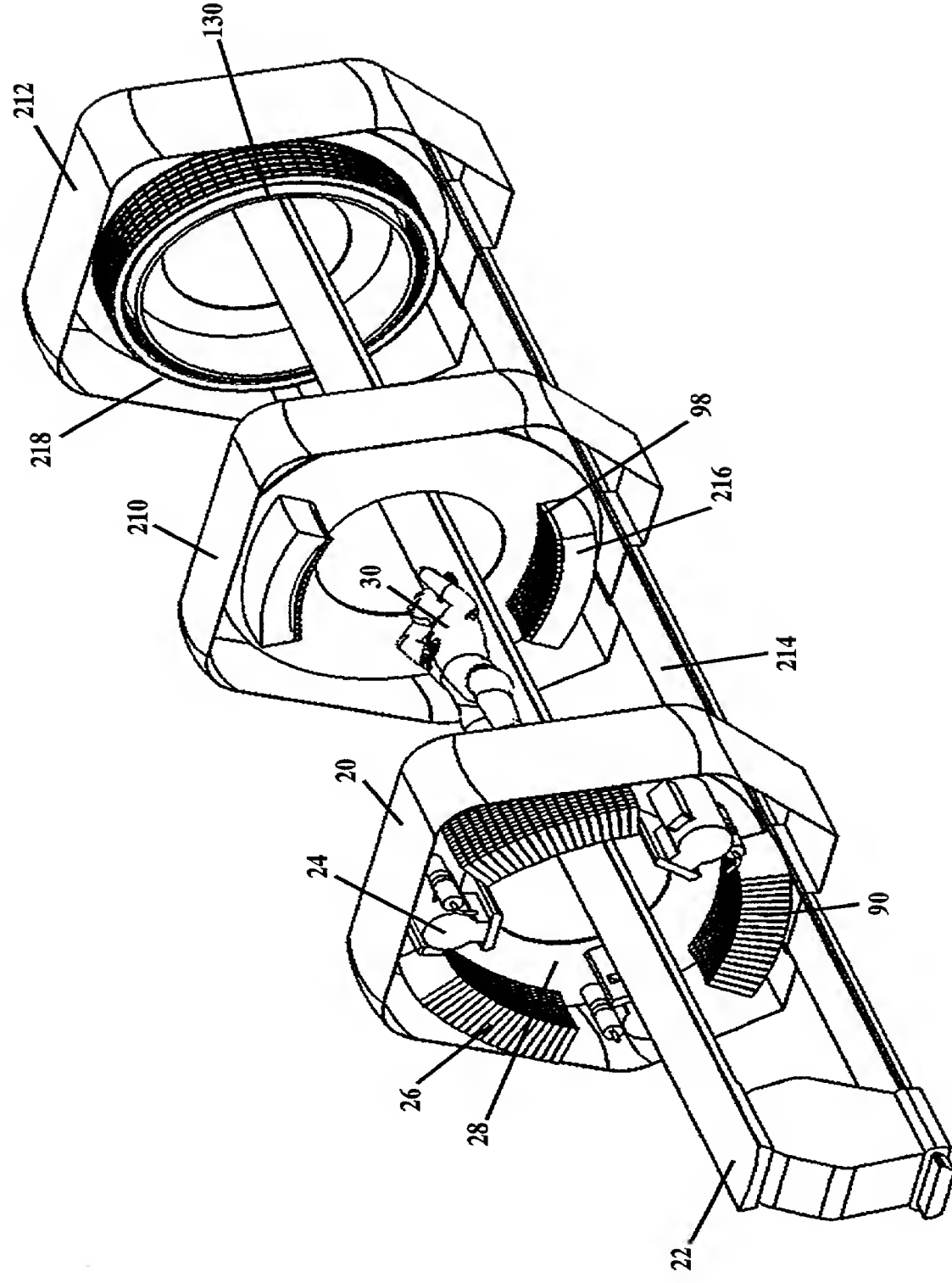


Figure 38

Multi-Modality Imaging with Independent X-Ray Single Head VCT, PET, and NM/SPECT Image Acquisition System

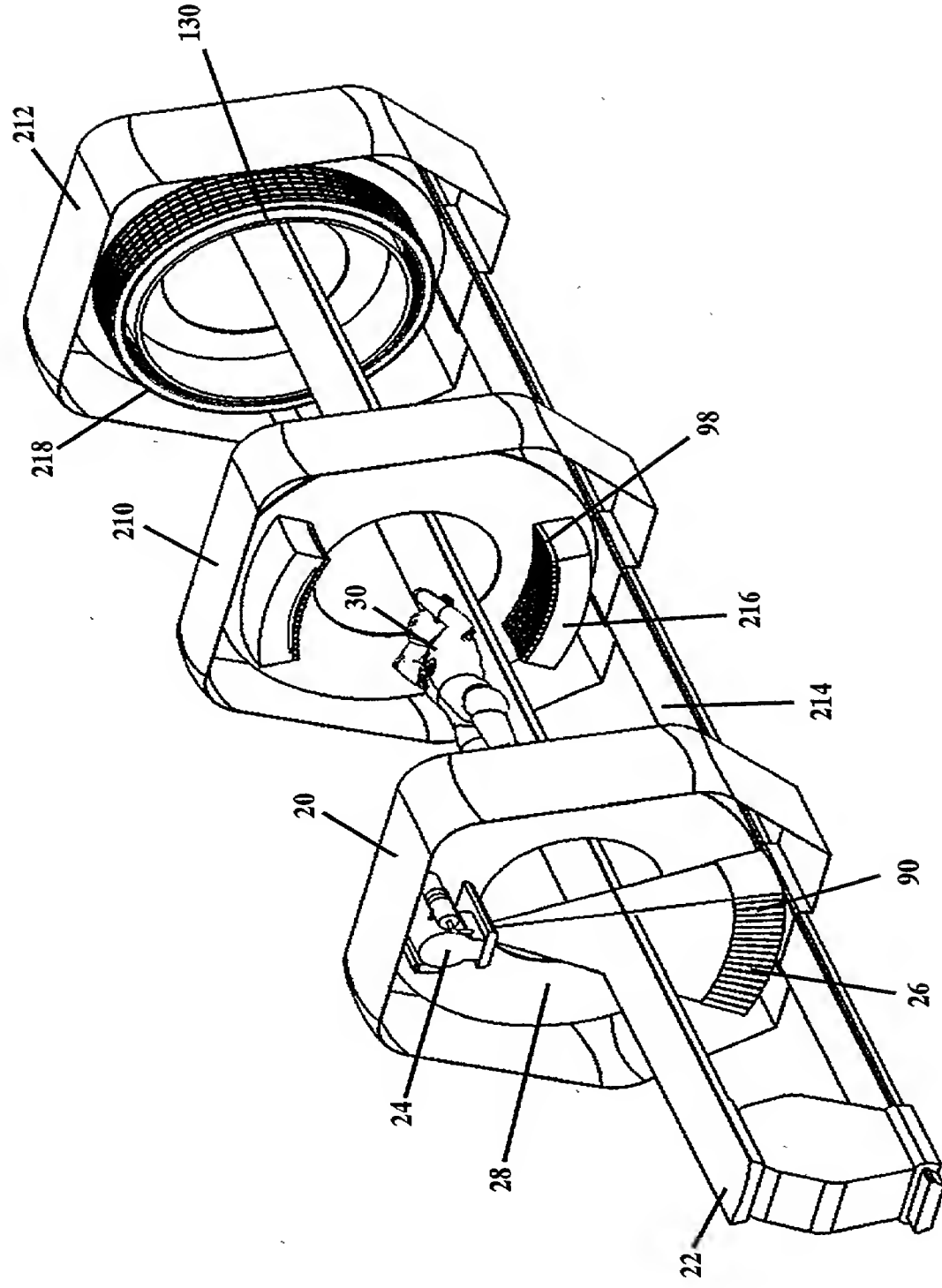


Figure 39

**Multi-Modality Imaging with Independent X-Ray 4th Generation VCT,
PET, and NM/SPECT Image Acquisition System**

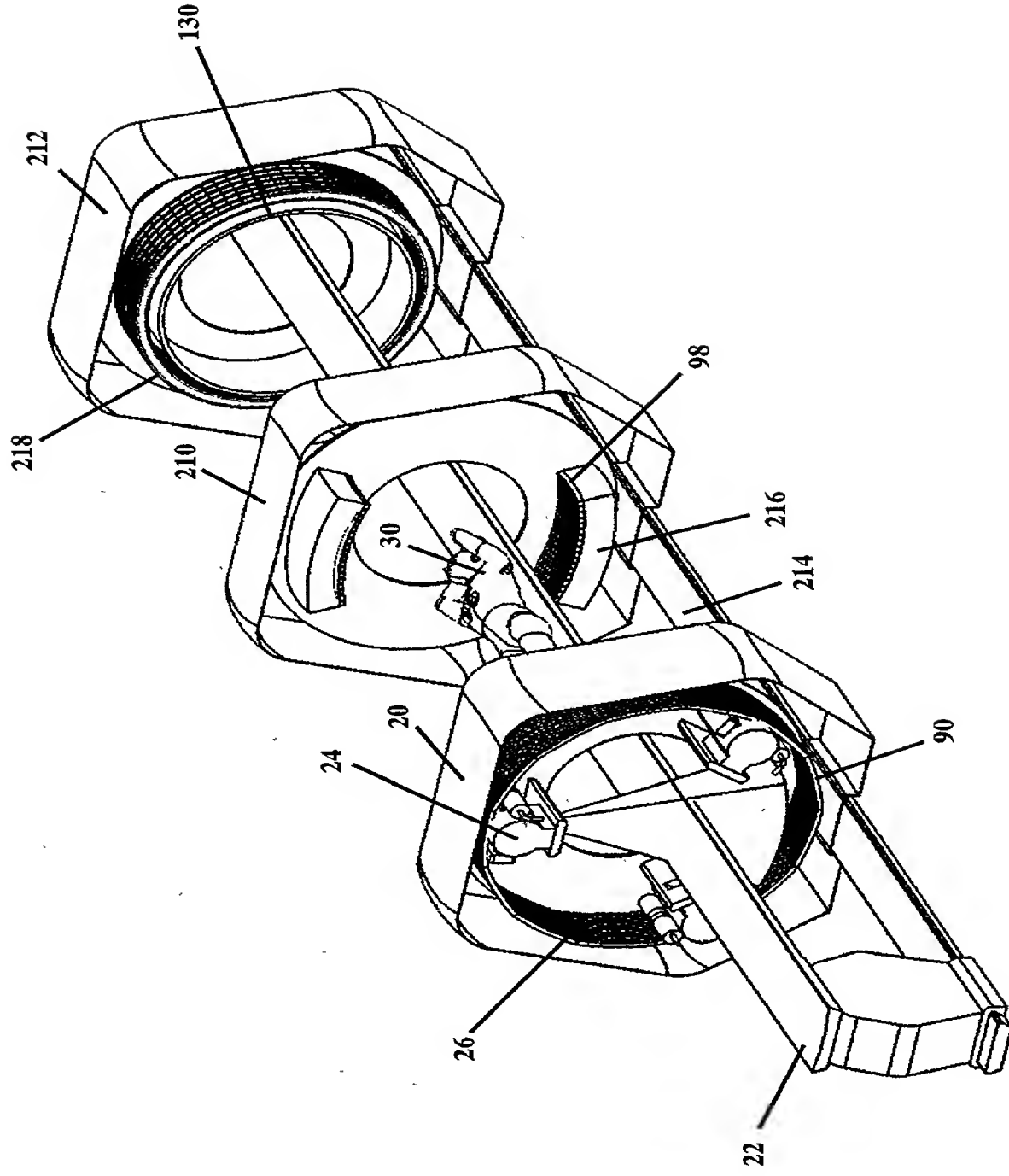


Figure 40

**Multi-Modality Imaging System with Stationary
Focused 2D Curved Detector for VCT, PET and NM/SPECT Imaging**

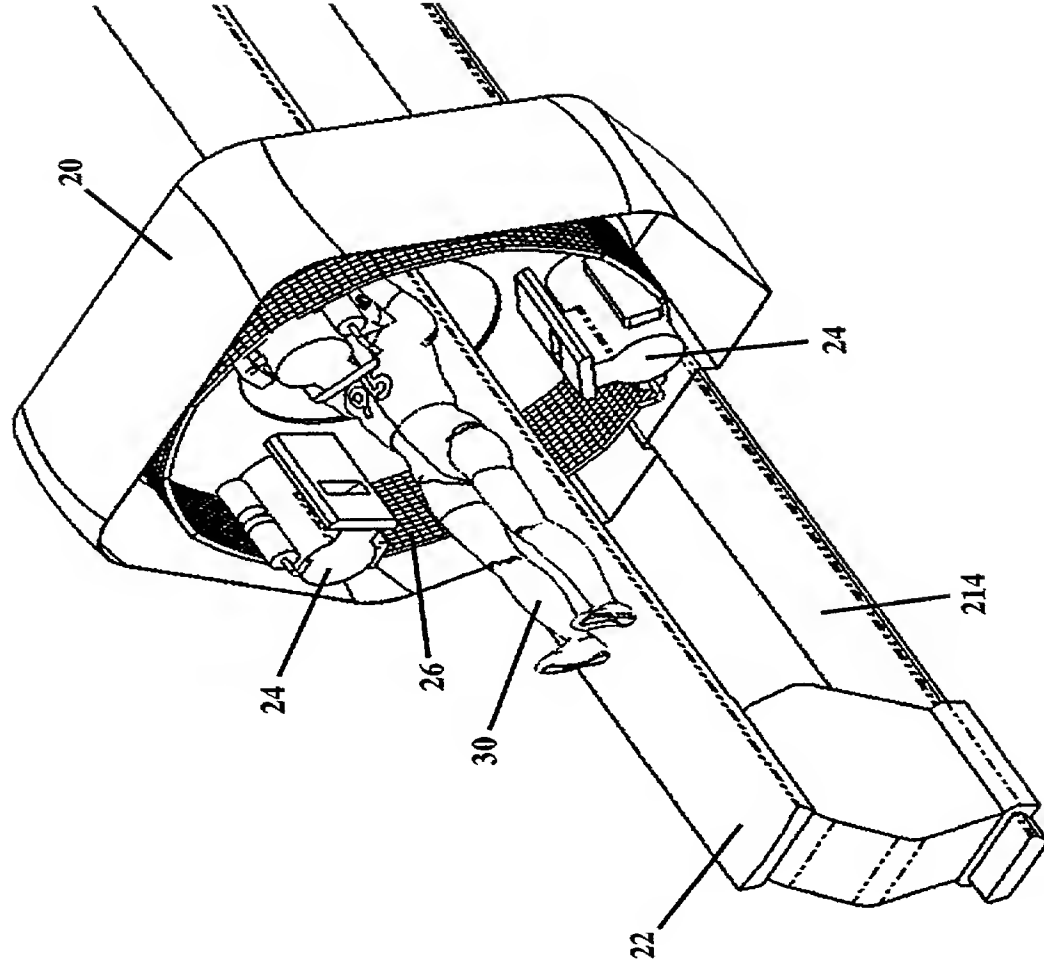


Figure 41

**Multi-Modality Imaging with Common Gantry and Independent X-Ray VCT,
PET, and NM/SPECT Image Acquisition System**

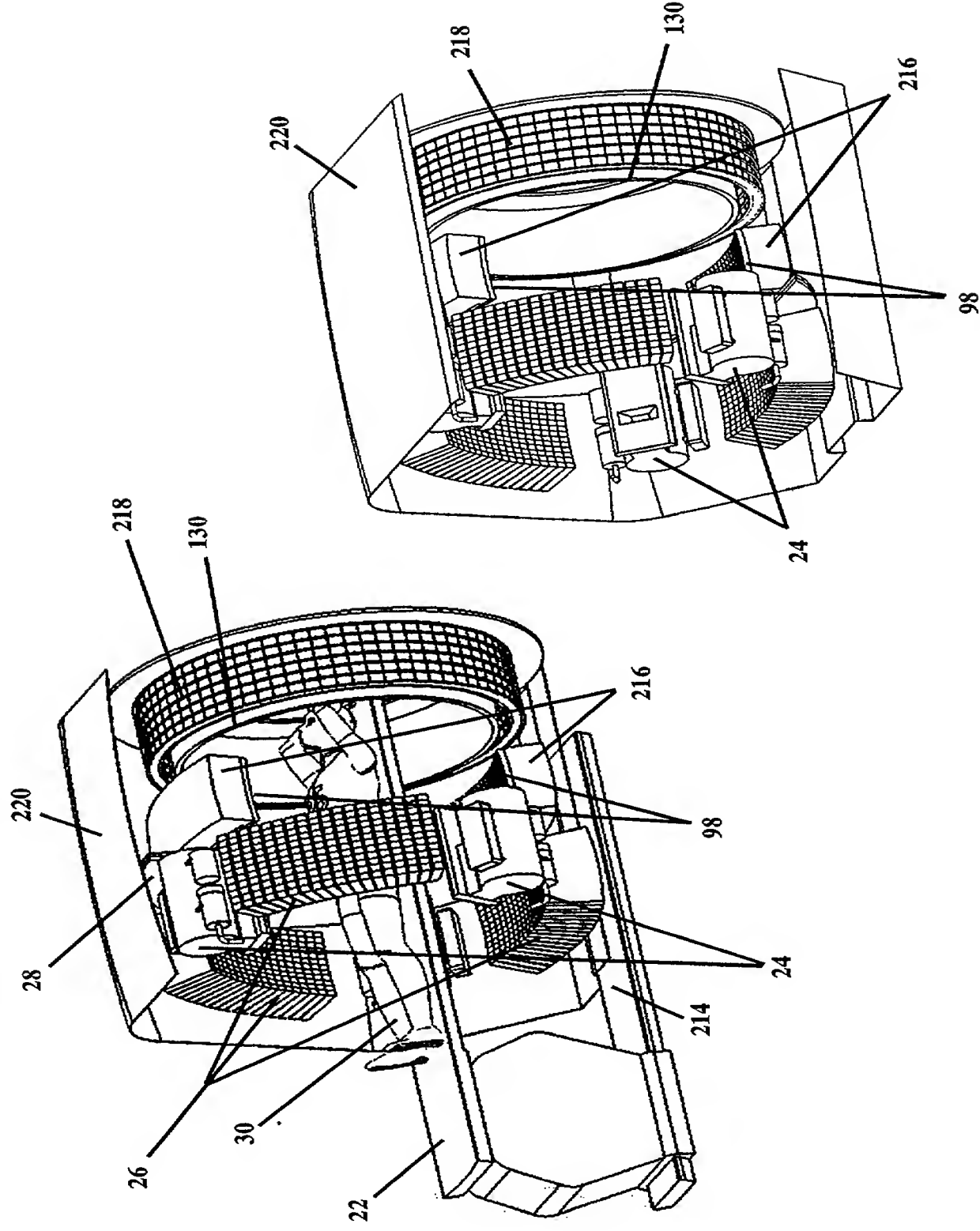


Figure 42

**Multi-Modality Imaging with Common Gantry and Independent X-Ray
Single Head VCT, PET, and NM/SPECT Image Acquisition System**

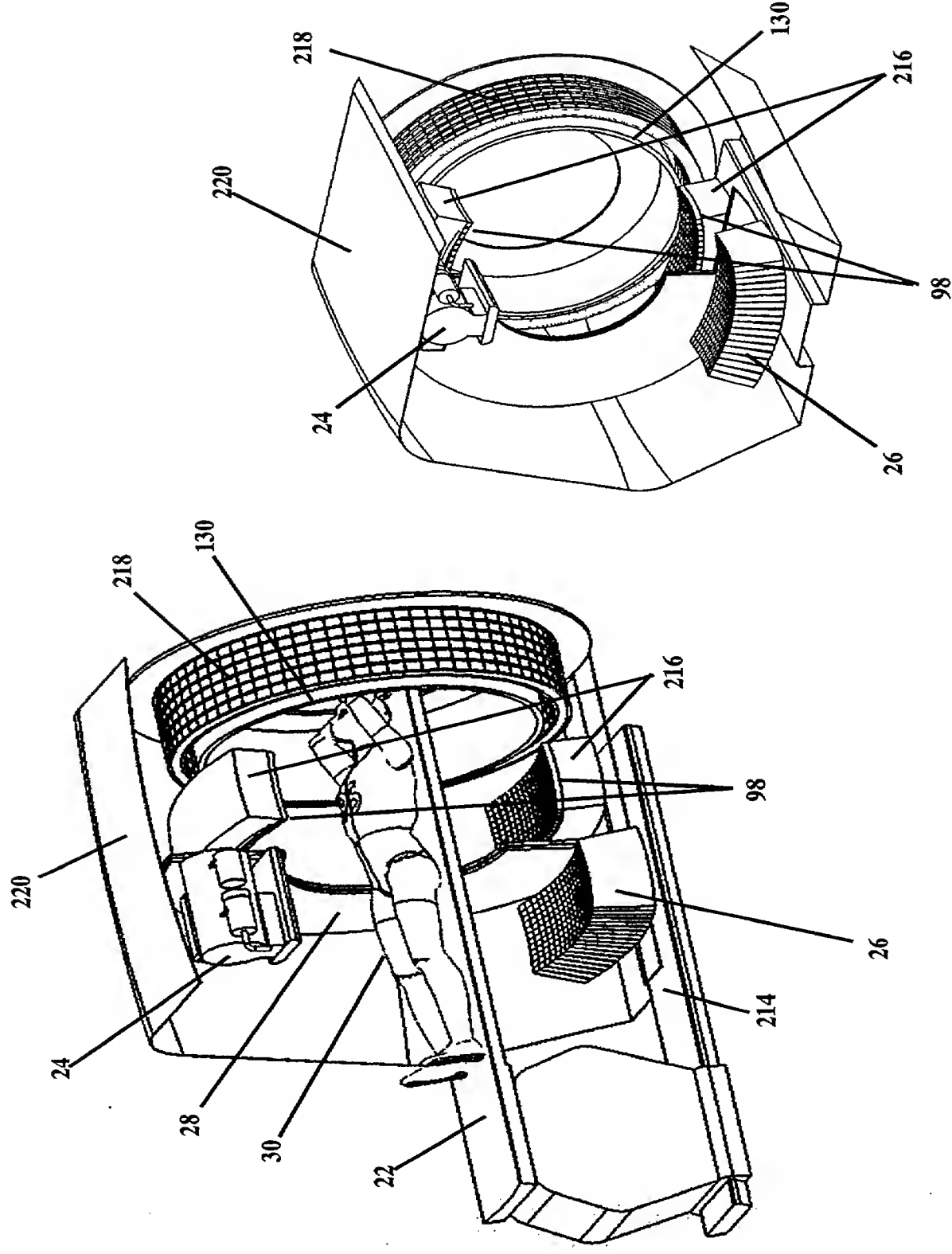


Figure 43

Multi-Modality Imaging with Common Gantry and Independent X-Ray
4th Generation VCT, PET, and NM/SPECT Image Acquisition System

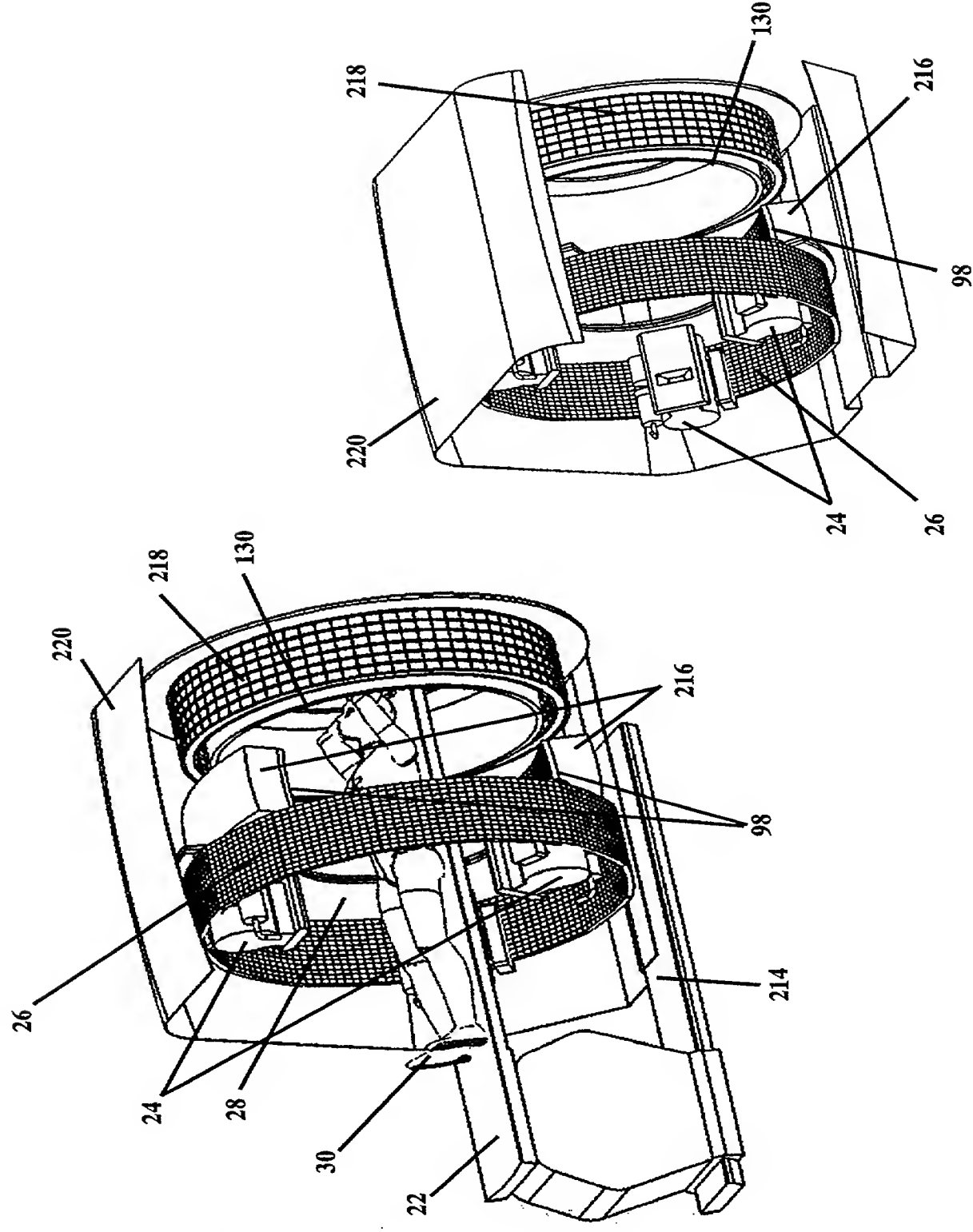


Figure 44

